

Inštitut za konstrukcije,
potresno inženirstvo in
računalništvo
*Institute of Structural Engineering,
Earthquake Engineering
and Construction IT*

Univerza v Ljubljani
Fakulteta za gradbeništvo in
geodezijo

*University of Ljubljana
Faculty of Civil and
Geodetic Engineering*

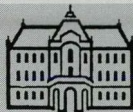


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Predstavitev inštituta Introducing the Institute

Inštitut za konstrukcije, potresno inženirstvo in računalništvo (IKPIR) je bil ustanovljen dne 27. 10. 1971 pod imenom Računski center Fakultete za arhitekturo, gradbeništvo in geodezijo kot interni inštitut fakultete za potrebe pedagoškega, znanstveno raziskovalnega in strokovnega dela. V prvih letih delovanja je skrbel predvsem za vzgojo kadrov in za razvoj nujno potrebne programske in računalniške opreme na področju gradbeništva, pa tudi za računalniško opremljenost fakultete.

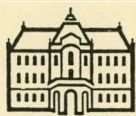
Jeseni leta 1980 se je preimenoval v Inštitut za konstrukcije, potresno inženirstvo in računalništvo, kar je odsevalo novo vsebino in obseg dejavnosti inštituta na treh poglavitnih področjih, ki jih pokriva pedagoško, raziskovalno in strokovno. V 25 letih se je razvil v najmočnejšo pedagoško raziskovalno enoto na fakulteti, tako po številu sodelavcev kot po številu opravljenih raziskovalnih projektov in objavljenih del. Ta publikacija podaja kratek prikaz pedagoškega dela ter najpomembnejših raziskovalnih in strokovnih dosežkov na posameznih področjih delovanja Inštituta in vanj vključenih profesorjev.

IKPIR, the Institute of Structural Engineering, Earthquake Engineering and Construction IT was founded on 27. 10. 1971, as a part of the Faculty of Architecture, Civil Engineering and Geodesy of the University of Ljubljana. Its original name was the Computing Centre of the Faculty, and it operated as an internal institute of the Faculty for the needs of its teaching, research and consulting work. In its early years the main tasks of this Centre were the education and the development of urgently needed software for the fields of building and civil engineering.

In the autumn of 1980 the Computing Centre was renamed as the Institute of Structural Engineering, Earthquake Engineering and Construction IT, which was an expression of the main fields covered, since that time, from the teaching, research and consultancy point of view. Over the last 25 years IKPIR has developed into the largest teaching and research unit at the Faculty, both according to the number of staff employed on a full time or a part-time basis, and according to the number of completed research projects and published works.

The aim of this publication is to provide a brief description of the teaching work carried out at IKPIR, as well as a survey of the most important achievements in research and consulting work in the different fields of work of the Institute, and of the academic staff who have been involved in this work.

Organizacijska shema Organization Chart



Univerza v Ljubljani

19 fakultet
3 visoke šole
3 akademije
1165 profesorjev
31 000 študentov

University of Ljubljana

19 faculties
3 university colleges
3 academies of art
1165 professors
31 000 students

Fakulteta za gradbeništvo in geodezijo

42 profesorjev
1005 študentov

Faculty of Civil and Geodetic Engineering

42 professors
1005 students

Oddelek za gradbeništvo

Konstruktivna smer

7 kateder in inštitutov
1 laboratorij

Department of Civil Engineering

Structural Division

7 chairs and institutes
1 laboratory

Inštitut za konstrukcije, potresno inženirstvo in računalništvo

Institute of Structural Engineering, Earthquake Engineering and Construction IT



Učitelji IKPIR-a imajo na dodiplomskem in podiplomskem študiju gradbeništva redna predavanja in vaje ter seminarje s področij statike in dinamike konstrukcij, masivnih konstrukcij (delno), potresnega inženirstva in računalništva, bili so tudi mentorji 20 doktorandom, 30 magistrantom in 176 diplomantom ter somentorji pri 85 diplomah in 7 magisterijih. Raziskovalci IKPIR-a so se intenzivno vključili v akcijo vzgoje mladih raziskovalcev. Bili so mentorji 27 mladim raziskovalcem, ki so se uspešno uveljavili, ne le v raziskovalnih organizacijah, ampak še zlasti na razvojnih in vodstvenih mestih v praksi. Inštitut je s svojimi sodelavci organiziral več kot 30 seminarjev za prakso, ki se jih je udeležilo prek 2500 projektantov. Tako je sproti prenašal rezultate raziskovalnega dela v projektantsko prakso in bistveno pripomogel k uvajanju uporabe sodobnih metod v analizi in pri projektiranju gradbenih konstrukcij.

Apart from their regular teaching work, i.e. lecturing, tutorials and seminars in the fields of the statics and dynamics of structures, reinforced-concrete structures (partly), earthquake engineering and computing, as part of undergraduate and postgraduate curricula for degrees in civil engineering, the academic staff of IKPIR have acted as mentors to 20 Ph.D. students, 30 M.Sc. students, and 176 B.Sc. students, and as co-mentors to 85 B.Sc. students and 7 M.Sc. students.

The researchers at IKPIR have played an important part in the government-supported programme for the training of young researchers. They have acted, as mentors to 27 young researchers, who have not only started to make important contributions within various research organizations, but have also assumed important responsibilities in various fields of civil engineering.

Through its numerous seminars for practicing civil engineers (more than 30 since 1971, as many as 2500 engineers have taken part in them), the staff of IKPIR have endeavoured to provide a rapid transfer of research results into the design processes of the construction industry. In this way they have made an important contribution towards the introduction of modern methods of structural analysis in the design of building and civil engineering structures.

Raziskovalna in razvojna dejavnost Research and Development Activities



Sodelavci Inštituta za konstrukcije, potresno inženirstvo in računalništvo delujejo predvsem na treh področjih, ki so razvidna iz njegovega naziva in so podrobneje predstavljena na naslednjih straneh.

Dejavnost na področju konstrukcij obsega raziskave metod za projektiranje konstrukcij, razvoj računalniških programov in njihovo uvajanje v prakso, ter projekte, ki vključujejo nelinearne analize konstrukcij in industrijskih procesov.

Na področju potresnega inženirstva je Inštitut dosegel mednarodni nivo in priznanja pri razvoju novih metodologij projektiranja potresno varnih konstrukcij stavb, mostov in industrijskih objektov. Doma pa je odločilno vplival na dvig ravni projektantske prakse in regulative na področju potresnega inženirstva.

Intenzivna raba računalnika pri raziskovalnem delu je v novjšem času spodbudila raziskave splošnejših problemov rabe računalnika v gradbeništvu. To novo področje gradbene informatike obsega integrirano gradnjo, posredovanje informacij in upravljanje z informacijsko tehnologijo.

V preteklih letih je bilo opravljenih več kot 120 zahtevnih in obsežnih raziskovalnih in razvojnih projektov, objavljenih je bilo več sto člankov in referatov doma in v tujini. Izdanih je bilo prek 50 publikacij.

The staff of the Institute of Structural Engineering, Earthquake Engineering and Construction IT perform their work mainly in three fields, which are recognized in its title and presented on the following pages.

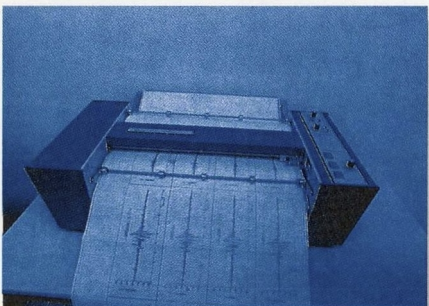
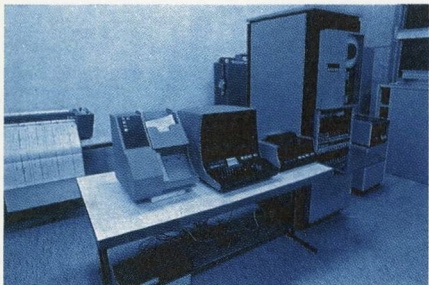
In the field of structures, IKPIR's work involves research into methods for the design of structures, the development of computer programs and their introduction into practice, and design projects involving the non-linear analysis of structures and industrial processes.

In the field of earthquake engineering, the Institute has achieved internationally recognized status and awards for its work in the development of new methodologies for the seismic design of building structures, bridges, and industrial structures. In Slovenia, the Institute has had a decisive effect on the raising of design standards, as well as on the introduction of adequate technical regulations in the field of earthquake engineering.

Over recent years, the ever more intensive use of the computer in research work has resulted in research into the more general problems of the use of the computer in building and civil engineering. The field of construction information technology includes integrated construction, information delivery, and the management of information technology.

Since 1971, a total of more than 120 important research and development projects have been carried out, and several hundred scientific and technical papers have been published in Slovenia and in other countries. More than 50 IKPIR publications have been printed.

Konstrukcije –
Računalniško projektiranje konstrukcij
Structures –
Computer aided design of structures



Sodelavci Inštituta so na začetku svojega delovanja proučevali sodobne metode analize konstrukcij, vključno z metodo končnih elementov. To je omogočalo uvajanje metode končnih elementov v študijski program, razvoj lastnih računalniških programov in uvajanje teh ter tujih računalniških programov za analizo konstrukcij v vsakdanjo prakso projektantov gradbenih konstrukcij. V tem času so bili razviti splošni programi za račun linijskih konstrukcij, plošč in objektov visokogradnje ter posebni programi za račun montažnih armiranobetonskih sistemov.

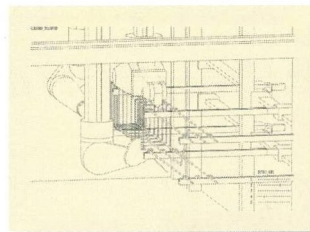
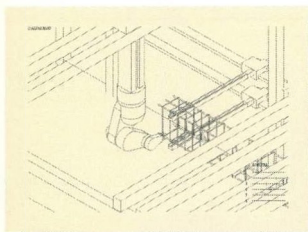
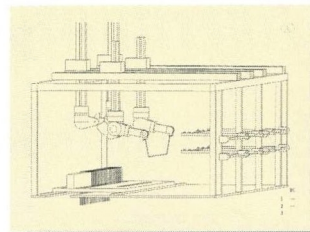
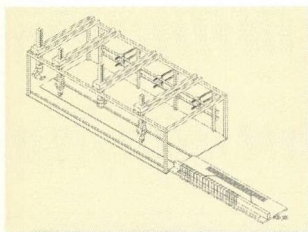
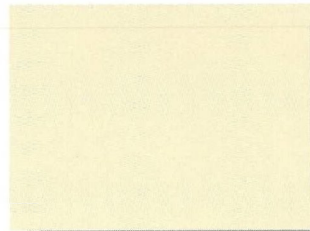
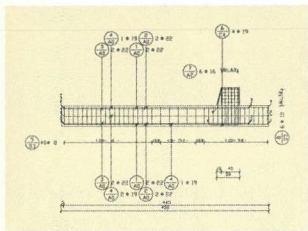
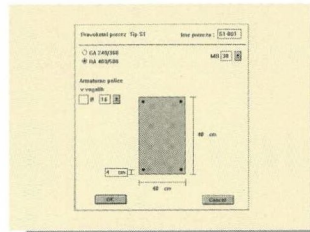
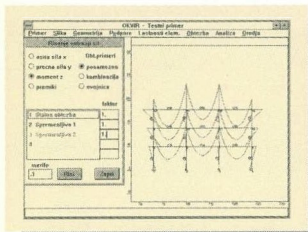
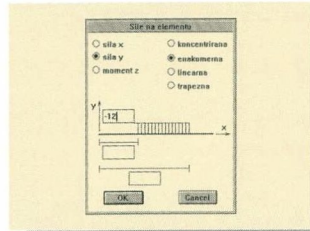
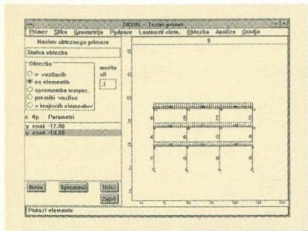
V začetku osemdesetih let je razvoj računalniške grafike omogočil uporabo računalnikov tudi pri tistih delih procesa projektiranja, ki so bili do takrat izvedljivi le s klasičnimi metodami. Na Inštitutu so bili raziskani postopki računalniškega projektiranja armature in razviti programi, katerih rezultat so bili armaturni načrti za montažne elemente, plošče, stene in okvirne konstrukcije. Rezultati teh programov so bili neposredno uporabni tudi za planiranje in vodenje proizvodnje v železokrivnicah. Večini obstoječih programov so bili dodani posodobljeni grafični pred- in poprocesorji. V drugi polovici osemdesetih let smo začeli z raziskavami ekspertnih sistemov na področju tehniških predpisov.

In the early years of work of the Institute, members of IKPIR's staff were engaged in studies of then new methods for the analysis of structures, including the Finite Element Method. This made possible the introduction of the Finite Element Method into the regular curriculum, the development of the Institute's own computer programs, and the introduction of these and other structural analysis computer programs into the everyday practice of designers of building and civil engineering structures. It was at this time that general computer programs for the analysis of linear structures, slabs and high-rise structures were developed, as well as special computer programs for the analysis of building systems consisting of precast reinforced-concrete elements. At the beginning of the 1980's, the development of computer graphics made possible the use of computers in those parts of the design process which could previously only have been performed using traditional methods. Methods for the computerized design of reinforcement were studied, and computer programs were developed which were able to produce reinforcement plans for precast elements, slabs, walls and frame structures.

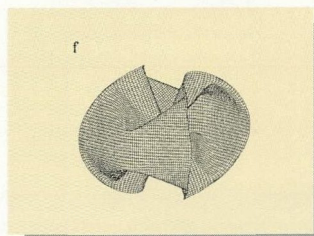
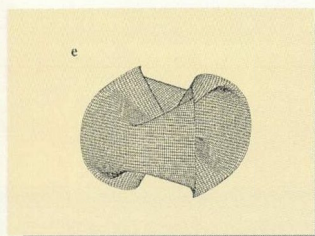
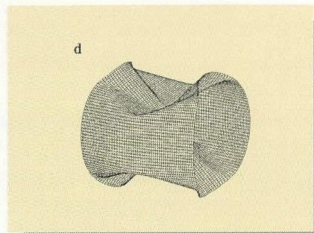
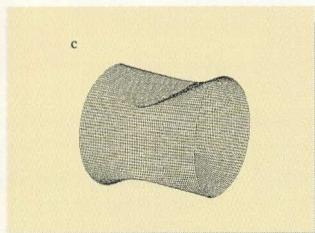
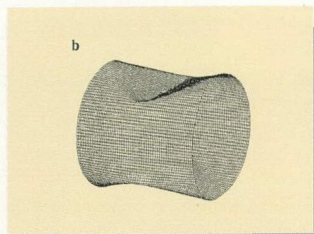
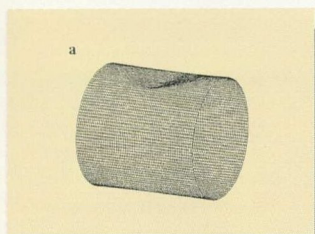
Konstrukcije – Računalniško projektiranje konstrukcij Structures – Computer aided design of structures

Kot nadaljevanje raziskav postopkov za projektiranje armature sedaj raziskujemo možnosti za robotizirano sestavljanje armature. Procese sestavljanja proučujemo z uporabo programov za simulacijo robotiziranih procesov, ki omogočajo oceno izvedljivosti in gospodarnosti robotskih sistemov. Vključeni smo v programa TEMPUS in ESPRIT, ki ju financira Evropska unija.

The results achieved by these programs could be used directly for the planning and management of production at bar-bending plants. Up-to-date graphic pre- and post-processors were added to the majority of existing computer programs. In the second half of the 1980's research work was begun into expert systems in the field of technical regulations. As an extension of the previously carried out research into the design of reinforcement, at present possibilities for the robotized assembly of reinforcement are being investigated. The assembly processes are being studied by means of computer programs for the simulation of robotized processes, which will make possible a realistic assessment of the feasibility and costs of robotized systems. IKPIR is involved in the TEMPUS and ESPRIT programs, which are financed by the European Union.



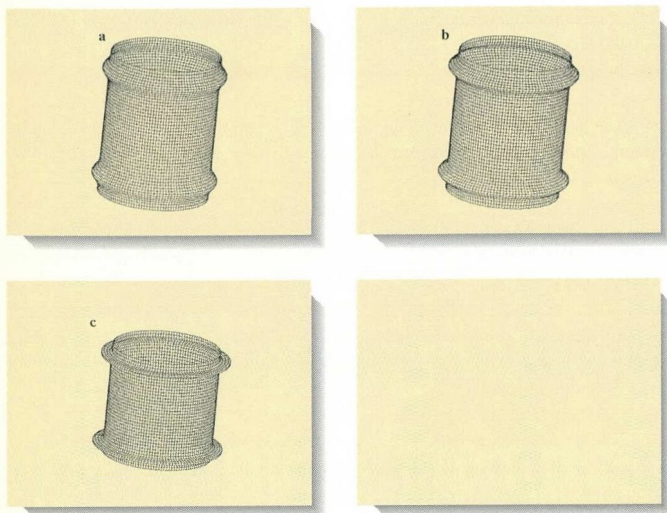
Konstrukcije –
Nelinearna numerična analiza
Structures –
Non-linear numerical analysis



Konec osemdesetih let smo na Inštitutu začeli izvajati raziskovalne projekte na področju nelinearne numerične analize konstrukcij in industrijskih procesov. To je omogočilo uveljavitev Inštituta v novih okoljih. Izvajamo temeljne raziskave nelinearnih numeričnih postopkov, razvijamo računalniške programe ter sodelujemo pri reševanju zahtevnih praktičnih inženirskih nalog. Med drugim so bili razviti različni nelinearni numerični modeli ter programska oprema za nelinearno analizo armiranobetonskih konstrukcij, za analizo dinamične interakcije tekočina-konstrukcija ter za nelinearno nestacionarno analizo prehoda toplote in termomehanskih problemov (od orodij za toplotno oblikovanje industrijskih izdelkov do industrijskih polvodnikov). Poleg različnih nelinearnih modelov za opis mehanskega obnašanja materialov (kot so elastoplastični, elastoviskoplastični ter realni model za beton, ki upošteva razpoke v nategu in porušitev v pritisku) smo razvili tudi model za gumijaste materiale in elastomere. Na podlagi modela za gibanje viskozne tekočine je bil razvit tudi model za opis gibanja plazov. Izpeljan je bil poseben termomehanski model za simulacijo obdelovalnega procesa za steklo in plastiko.

At the end of the 1980's, a number of research projects were begun at the Institute involving the non-linear analysis of structures and industrial processes. This has provided affirmation of the Institute's work in several new areas. As well as performing fundamental research into non-linear numerical procedures and the development of computer programs, the Institute also participates in the solving of complex practical engineering problems. Various non-linear numerical models have been developed, together with software for the non-linear analysis of reinforced-concrete structures, for the analysis of the dynamic interaction between structures and liquids, and for the non-linear, transient analysis of heat transfer and of thermo-mechanical problems (ranging from tools for the heat treatment of industrial products, to industrial semi-conductors). Apart from various non-linear models for the description of the mechanical behaviour of materials (e.g. the elasto-plastic model, the elasto-visco-plastic model, and the realistic model for concrete, which takes into account cracks in tension and failure in compression), a model for rubberlike materials and elastomers has also been developed. A model for the description of the movement of landslides has been developed on the viscous flow formulation. A special thermo-mechanical model for the simulation of processes for the treatment of glass and plastics has also been derived.

Konstrukcije –
Nelinearna numerična analiza
Structures –
Non-linear numerical analysis



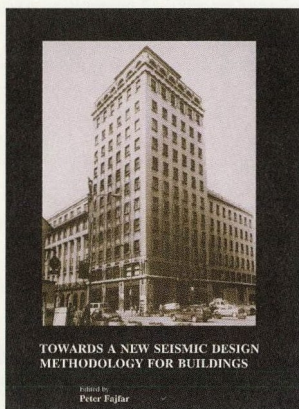
Razviti nelinearni numerični modeli omogočajo analizo širokega spektra različnih nalog, ki jih z uporabo standardnih linearnih modelov ni mogoče rešiti ali pa so rešitve premalo natančne. Razvijamo nov model za statično in dinamično analizo tenkih lupin, ki bo v primerjavi z doslej znanimi omogočal natančnejšo analizo tankih lupinastih konstrukcij z velikimi pomiki in zasuki in analizo rezervoarjev, izdelanih iz plastičnih laminatov. Izboljšujemo model za realni nelinearni opis obnašanja armiranega betona, ki bo primeren za analize zahtevnih konstrukcij, kot so npr. hladilni stolpi, dimniki, industrijske hale in mostovi. Začeli smo z razvojem sodobnega programa za avtomatično načrtovanje predorov in globokih izkopov. Vključeni smo v več mednarodnih projektov, ki jih financira Evropska unija v okviru programov TEMPUS, COPERNICUS in CEEPUS.

The availability of all these non-linear numerical models has made it possible to analyse a wide spectrum of tasks which either cannot be solved by using standard linear methods or whose solutions would be insufficiently accurate.

At present a new model for the static and dynamic analysis of thin shells is being developed, which will, in comparison with presently known formulations, make possible more accurate analysis of thin shell structures with large displacements and rotations, and will also be applicable to the analysis of large plastic-laminate containers. Improvements are being made to the model for the realistic non-linear behaviour of reinforced-concrete, which will make this model suitable for the analysis of complex structures such as cooling towers, chimneys, large industrial buildings, and bridges. A start has been made to the development of a program for the computerized design of tunnels and deep excavations.

In this field, the Institute is involved in a number of international projects financed by the European Union within the framework of the TEMPUS, COPERNICUS and CEEPUS programs.

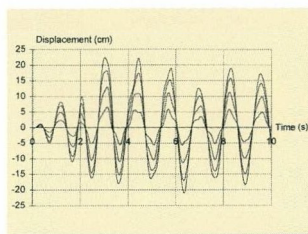
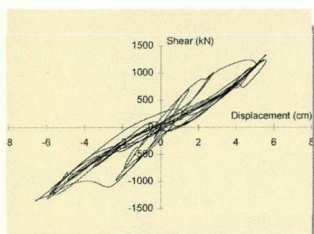
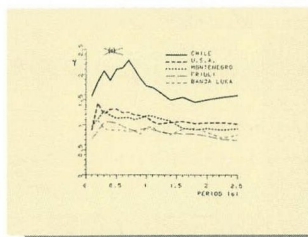
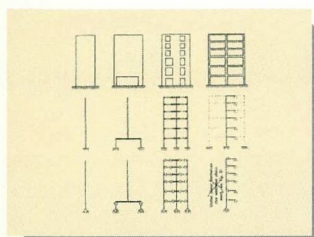
Potresno inženirstvo *Earthquake engineering*



Potresno inženirstvo je veda, ki se ukvarja z vplivom potresa na gradbene objekte in opremo ter proučuje njihovo odpornost proti potresom. Reševanje problemov s področja potresnega inženirstva zahteva interdisciplinarni pristop, pri čemer so najbolj pomembna znanja s področja teorije konstrukcij in konstruktorstva, posebno tesna pa je povezava z inženirsko seizmologijo. Pod vplivom potresa pride do nelinearnih cikličnih deformacij konstrukcij, zato zahteva potresno inženirstvo dobro poznavanje obnašanja materialov in konstrukcij do meje njihove nosilnosti in deformabilnosti. Iz tega razloga je potresno inženirstvo veda, ki utira pot k napredku na področju gradbenih konstrukcij.

Raziskave na področju potresnega inženirstva se odvijajo od samega začetka delovanja IKPIR-a. Najprej so bile omejene na elastično analizo objektov visokogradnje. Kot rezultat tega dela je nastal znani program EAVEK, ki je še danes, v nekoliko dopolnjeni in spremenjeni obliki, nepogrešljivo orodje pri projektiranju konstrukcij stavb. Kasneje se je področje raziskav razširilo na nelinearno analizo objektov visokogradnje, neelastične spektre odziva, določanje potresnih obremenitev, energijske metode, predpise o potresno varni gradnji, metodologije potresno varnega projektiranja, analizo in projektiranje premostitvenih objektov in računalniška orodja za podporo potresno varnemu projektiranju.

Earthquake engineering is a discipline which deals with the effects of earthquakes on buildings and other kinds of structures, including their equipment, and involves studies of the resistance of these structures to seismic loads. If problems in the field of earthquake engineering are to be adequately solved, then an interdisciplinary approach is needed. Most important is knowledge from the fields of the theory of structures and structural design, and the link with engineering seismology is a particularly strong one. Earthquakes produce non-linear cyclic deformations of structures, so good knowledge of the behaviour of materials and structures up to their limits of load-bearing capacity and deformability forms one of the most important elements of earthquake engineering. As a result, earthquake engineering is at the forefront among those disciplines which lead to further progress in the field of structural engineering. Research in the field of earthquake engineering has been going on ever since IKPIR was first established. At first this research was limited to the elastic analysis of high-rise buildings. The result of this research was the development of the well-known computer program EAVEK, which is still today, in its updated and more sophisticated version, an irreplaceable tool when designing building structures. Later, research was extended to include the non-linear analysis of building structures, inelastic response spectra, the determination of seismic loads, energy-based methods, seismic regulations, methodologies for seismic design, the analysis and design of bridge structures, and computer tools for the support of the seismic design of structures.



Raziskovalci IKPIR-a so se uveljavili doma in se dejavno vključili v svetovne tokove razvoja potresnega inženirstva, pri čemer dosegajo mednarodno odmevne rezultate. O tem pričajo številni članki v mednarodnih revijah, vabila na položaj gostujočih profesorjev in za predavanja na najbolj znanih tujih univerzah (med njimi Univerza v Stanfordu, McMaster Univerza v Hamiltonu, ETH v Zürichu, Technion v Haifi, Tsinghua Univerza v Pekingu) in na mednarodnih konferencah, članstva v uredniških odborih mednarodnih revij (med njimi Earthquake Engineering and Structural Dynamics, Journal of Earthquake Engineering in Soil Dynamics and Earthquake Engineering) in v znanstvenih odborih mednarodnih konferenc, članstva v delovnih skupinah mednarodnih strokovnih organizacij in mednarodnih uradov za standardizacijo, dolgoletno sodelovanje v mednarodnih projektih, med drugim v tistih, ki jih financirata skupni Slovensko-ameriški odbor za znanstveno in tehnično sodelovanje (skupni projekti z univerzama v Berkeleyu in Stanfordu ter z NISTom) in Evropska unija (projekti v okviru programov INCO-COPERNICUS, COST in TEMPUS) ter številna domača in tuja priznanja (med njimi najpomembnejša državna nagrada za raziskovalno delo).

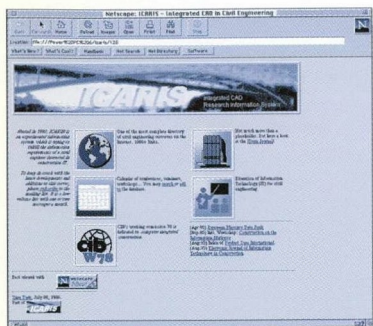
Through their achievements, the researchers of IKPIR have become well-known in Slovenia, and have at the same time become involved in world-wide developments in earthquake engineering, so that the results of their research work are internationally recognized. This is proved by the numerous articles that have been published in international journals of high standing, by invitations to the position of visiting professor and lectures given at well-known foreign universities (such as Stanford University, McMaster University at Hamilton, ETH of Zürich, Technion of Haifa, Tsinghua University of Peking), by membership of the editorial boards of a number of international journals (including Earthquake Engineering and Structural Dynamics, the Journal of Earthquake Engineering, Soil Dynamics and Earthquake Engineering) and in the scientific committees of international conferences, by membership of the working committees of international professional organizations and of international committees for standardization, by cooperation over many years in international research projects, including those financed by the U.S. - Slovenian Joint Board for Scientific and Technological Cooperation (joint projects with the University of California, Berkeley, with Stanford University, and with the NIST) and by the European Union (projects within the framework of the INCO-COPERNICUS, COST and TEMPUS programs), as well as by numerous Slovenian and foreign awards (including the most important national award for research work).

Potresno inženirstvo Earthquake engineering

Zelo odmevna je bila mednarodna delavnica Nelinearna seizmična analiza in projektiranje armiranobetonskih stavb, ki jo je IKPIR organiziral skupaj z Univerzo v Stanfordu na Bledu leta 1992. Raziskovalna skupina hkrati s temeljnimi raziskavami opravlja tudi aplikativne in razvojne raziskave, rezultate pa v obliki predpisov, seminarjev, razvojnih projektov ter prek mladih raziskovalcev in študentov uspešno prenaša v prakso.

The international workshop entitled "Non-linear seismic analysis and design of reinforced concrete buildings", which was organized by IKPIR together with Stanford University and took place at Bled in Slovenia in 1992, was a particularly resounding success. Members of the research group also carry out, apart from fundamental research, applicative and developmental studies, and the results of this work are transferred into practice through the updating of technical regulations, seminars, and developmental projects, as well as through the work of young researchers and students.





Glavni cilj gradbene informatike je računalniška podpora pri zagotavljanju informacij skozi celo življenjsko dobo gradbenega objekta.

Že v času velikih centralnih računalnikov so bile na IKPIR-u izdelane zelo kvalitetne programske knjižnice za risanje, za izdelavo uporabniških vmesnikov in za hranjenje podatkov. Posledica hitrega razvoja informacijske tehnologije je bilo uvajanje jezikov C in C++, objektnih zbirk podatkov in prijaznih uporabniških vmesnikov v programe, ki smo jih pisali za osebne računalnike. Med prvimi smo tako začeli uvajati objektni pristop in izkazalo se je, da je tudi za gradbeniške probleme zelo primeren. Sistematično smo računalniško integrirano gradnjo raziskovali v letih 1993-95 v okviru temeljnega raziskovalnega projekta »Računalniško integrirano projektiranje in gradnja armiranobetonskih konstrukcij«. Vključili smo se v delovno skupino mednarodne organizacije CIB, ki se ukvarja z računalniško integrirano gradnjo. Proučevali smo načine za računalniški zapis predpisov, računalniško obvladovanje tehnične dokumentacije, celostne informacijske sisteme in objektivne zbirke podatkov.

V letu 1993 smo se kot eden izmed prvih univerzitetnih gradbenih oddelkov začeli pojavljati na Internetu. Tam smo oblikovali nekaj dobro obiskanih in citiranih servisov, ki so predvsem namenjeni mednarodni skupnosti raziskovalcev in učiteljev. V letih 1994 in 1995 smo v sodelovanju z ZRMK in Gradbenim centrom Slovenije pripravili jedro slovenskega tehničnega informacijskega sistema za gradbeništvo (TIGRA). Svojevrstno priznanje delu na tem področju je organizacija mednarodne delavnice z naslovom »Gradbeništvo na informacijski avtocesti«. Sodelujemo v evropskem ESPRIT projektu o sočasnih gradnji ToCEE.

The goal of construction information technology is to provide computerized information management throughout the life-cycle of a building product. Back in the days of large centralized computers, IKPIR produced high quality software for computer graphics, user interface design and data management. The consequence of the rapid development of information technology and the introduction of personal computers has been the introduction of languages C and C++, of object-orientated data-bases, and of user-friendly interfaces. IKPIR was amongst the first in the field to take advantage of the object-orientated approach, which turned out to be very suitable for structural and civil engineering problems. Computer integrated construction (CIC) was systematically researched at IKPIR during the period 1993-95 within the national research project »The computer integrated design and construction of reinforced-concrete structures«. IKPIR also participates in the work of the CIB working group on CIC. We have also been studying the computerization of building regulations, the electronic technical document management, for integrated information systems, and object-orientated data-bases. In 1993, IKPIR was among the first in the field to start publishing on the Internet. IKPIR has prepared a number of frequently visited and read services, which were aimed at the international community of researchers and teachers. Together with the ZRMK and the Building Centre of Slovenia, IKPIR set up the core of Slovenia's technical information system for building and civil engineering - TIGRA. The organization of the international workshop »Construction on the Information Highway« has also further affirmed the work of IKPIR in this field. IKPIR is also a full partner in the European Union's ESPRIT project on concurrent engineering - ToCEE.



Inštitut je vseskozi skrbel za prenos raziskovalnih rezultatov v prakso, projektantsko in konzultantsko dejavnost ter razvoj predpisov s področja gradbeništva (posebej je dejaven pri uvajanju novih evropskih standardov za konstrukcije Eurocode v Sloveniji). Obsežno delo je bilo opravljeno tudi pri analizi vzrokov porušitev in ocenjevanju škode po potresih. Sodelavci so izdelali več sto zahtevnejših študij, razvojnih nalog in strokovnih projektov. Nekaj značilnih je navedenih v nadaljevanju.

Programska oprema za projektiranje gradbenih konstrukcij (1971-96)

Programsko opremo, razvito v IKPIR-u, uporablja večina projektantov gradbenih konstrukcij v Sloveniji in z njo je izračunan večji del pomembnejših stavb.

Statični računi montažnih ločnih konstrukcij GORICA (1971-80)

Izdelanih je bilo več kot sto statičnih računov za objekte po vsej Jugoslaviji. Pri tem je bil uporabljen program, izdelan na Inštitutu. Rezultati programa so notranje sile, napetosti betona in temeljnih tal ter potrebna armatura.

Stanovanjski objekti, visoki od 12-22 etaž v stanovanjskem naselju Knježevac v Beogradu (1976)

Izdelani so bili projekti za konstrukcijo stanovanjskih stavb, pri čemer so bili uporabljeni vsi razpoložljivi računalniški programi za račun konstrukcij.

Račun konstrukcije ločnega mostu in odra v Solkanu (1981-83)

Za cestni ločni most v Solkanu so bili izdelani statični in dinamični računi. Tudi pri tem projektu so bili uporabljeni na Inštitutu razviti programi.

Ever since it was first established, the staff of IKPIR, has endeavoured to achieve the transfer of research results into practice, into civil engineering design and consultancy work, and into the development of updated technical regulations for the fields of building and civil engineering (IKPIR is particularly active in the implementation of the new European standards for structures Eurocodes - in Slovenia). Members of IKPIR's staff have also carried out several hundred complex studies, development projects, and consulting jobs. Listed below are some typical examples of this work.

Computer software for the design of building structures (1971-96)

This computer software, developed at IKPIR, is used by the majority of designers of building structures in Slovenia, and has been applied to the majority of Slovenia's more important buildings, built over this period.

Structural analysis of GORICA prefabricated structures (1971-80)

More than one hundred structural analyses were performed for structures built in all parts of the former Yugoslavia. A computer program developed at the Institute was used. The results of the program consisted of the internal forces, the stresses in the concrete and in the subsoil beneath the foundations, and the necessary reinforcement.

Residential tower-blocks, 12 to 22 storeys high, in the Knježevac Housing Estate in Belgrade (1976)

Designs were made of the load-bearing structures of these tower-blocks, using all available computer programs for the analysis of structures.

Structural analysis of the load-bearing structure of the arched bridge at Solkan, and of the supporting shuttering (1981-83)

Static and dynamic analyses were performed for the arched road bridge at Solkan. Computer programs developed at IKPIR were used for this design project, too.

Revizija gradbenih projektov
Nacionalne in vseučiliščne
knjižnice v Zagrebu (1983 in
1987-90)

Projektanti Tehnike in
Građevinskega inštituta iz
Zagreba so projektirali zahtevno
konstrukcijo nove stavbe knjižnice
v Zagrebu. Revizijo je sproti
opravljala IKPIR, pri čemer so pri
posameznih delih konstrukcij
sodelovali tudi člani drugih
kateder. Ob zglednem
sodelovanju projektantov in
revidentov, ki so opravili številne
kontrolne analize, je bilo
odpravljenih več napak v projektih
in danih nekaj predlogov za
pomembna izboljšanja
konstrukcije.

Razvoj velikopanelnega sistema SCT (1986-87)

V obsežnem raziskovalno-
razvojnem projektu so sodelovali
SCT, ZRMK in IKPIR. Rezultat
razvoja je bil velikopanelni sistem,
ki je primeren za gradnjo na
močnih potresnih območjih. Z njim
je v Ljubljani zgrajenih več kot
1000 stanovanj.

Seizmična analiza viadukta Reber (1990)

Leta 1990, ko še ni bilo na
razpolago ustreznih domačih
predpisov, sta bila opravljena
seizmična analiza in
dimenzioniranje
armiranobetonskega viadukta na
novem delu avtoceste Malence-
Šmarje Sap, ki ga sestavljata dve
vzporedni konstrukciji dolžine
600 metrov. Pri projektiranju so
bili uporabljeni izsledki
najnovejših tujih in domačih
raziskav.

*Review of the design for the
building structure of the National
and University Library at Zagreb
(1983 and 1987-90)*

*Designers at »Tehnika« and
»Građevinski inštitut« of Zagreb
had the task of designing the
complex structure of the new
library building in Zagreb. The
experts of IKPIR performed reviews
of the design as it progressed,
and members of some of the
Faculty's other chairs also
participated in the case of certain
parts of the structure. As the result
of excellent cooperation between
the designers and IKPIR's experts,
who carried out numerous
additional analyses, a number of
mistakes were eliminated from the
design, and several proposals for
significant improvements to the
structure were made.*

Development of the SCT large- panel system (1986-87)

*SCT, ZRMK (the Institute for
Testing and Research in Materials
and Structures), and IKPIR all
participated in an extensive
research and development
project. The result of this work was
the development of a large-panel
system which can be used for the
construction of buildings in regions
of high seismicity. Blocks
containing more than 1000 flats
have been built using this system
in Ljubljana.*

Seismic analysis of the Reber Viaduct (1990)

*In 1990, when adequate
Slovenian technical regulations for
the design of bridges in seismic
regions were not yet available, a
seismic design was carried out for
two parallel reinforced-concrete
viaducts, 600 m long, to be built
on the motorway section between
Malence and Šmarje Sap. In the
design, the findings of the latest
Slovenian and foreign research
work were taken into account.*

Verjetnostna analiza potresne nevarnosti na lokaciji Nuklearne elektrarne Krško (1991-94)

Strokovno in organizacijsko izredno zahteven projekt, kjer so bili ob uporabi najmodernejših metod na novo določeni projektni potresni parametri na lokaciji NEK. Študija, ki jo je naročila NEK, vodil pa IKPIR ob upoštevanju strogih zahtev za zagotavljanje kakovosti, je trajala 4 leta. Pri delu so sodelovali tudi strokovnjaki iz Seizmološkega zavoda RS, Geološkega zavoda iz Ljubljane, Rudarsko-geološko-naftne fakultete iz Zagreba ter številni tuji svetovalci.

Uvajanje standarda Eurocode 8/2 (1994-1995)

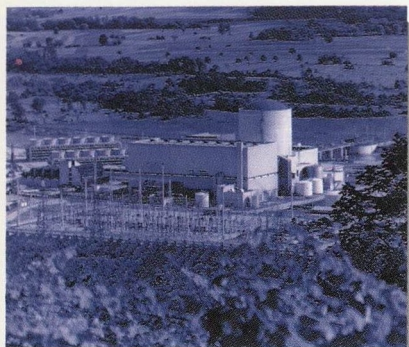
Glede na kritično stanje na področju predpisov in standardov za potresno varno projektiranje premostitvenih objektov pri nas in glede na intenzivno gradnjo takih objektov v okviru programa gradnje novih avtocest je bilo nujno potrebno v najkrajšem možnem času usposobiti evropski predstandard Eurocode 8/2, ki obravnava projektiranje mostov na potresnih območjih, za uporabo v Sloveniji. V okviru naloge, ki jo je financiral DARS, smo v obdobju 1994-95 pripravili nacionalni dokument za uporabo, slovenski prevod predstandarda in pet testnih primerov. Predstandard in dva testna primera smo izdelali tudi v obliki hiperteksta. Pripravili smo priročnik in organizirali dva seminarja za projektante.

Probabilistic analysis of the seismic hazard at the location of the Krško Nuclear Power Plant (1991-94)

This was, from the technical and the organizational point of view, an exceptionally demanding project, which involved the reassessment, using the most up-to-date methods, of the seismic design parameters for the location of the Krško Nuclear Power Plant. This study, which was ordered by the Krško Nuclear Power Plant, was headed by IKPIR, taking into account very stringent quality assurance requirements, and lasted for four years. Also taking part in the project were seismologists and geologists from Slovenia and Croatia, as well as numerous foreign experts.

Implementation of the Eurocode 8/2 Standard (1994-95)

Taking into account the critical state, in Slovenia, of the technical regulations and standards dealing with the seismic design of bridges, as well as the rapid building of such structures within Slovenia's new motorway construction program, it was necessary to establish, within the shortest possible time, the European pre-standard Eurocode 8/2, which deals with the design of bridges in seismic regions, for use in Slovenia. Within the framework of a research project, financed by DARS, the Company for Motorways in Slovenia, over the period 1994-95 a national application document, a translation of the pre-standard into Slovenian, and five test examples were prepared. The pre-standard and two of the test examples have been prepared in the form of hypertext. A handbook has been prepared, and two seminars for designers have been organized.



Numerična analiza nosilnosti hladilnega stolpa bloka 5 (stolp 4 višine 80 m) v TE Šoštanj (1995)

Analizirali smo nosilno konstrukcijo plašča hladilnega stolpa z namenom, da določimo problematična mesta za sanacijo konstrukcije na osnovi dejanske geometrije in stanja konstrukcije. Konstrukcija je analizirana kot prostorski palični sistem, obremenjen z lastno težo, vetrom in temperaturo. Rezultati analize so bili podlaga za izdelavo ustrezne in tudi nujne sanacije stolpa.

Numerical structural safety evaluation of the cooling-tower of Block 5 (tower No. 4 of height 80 m) of the Šoštanj Thermo-Electric Power Plant (1995)

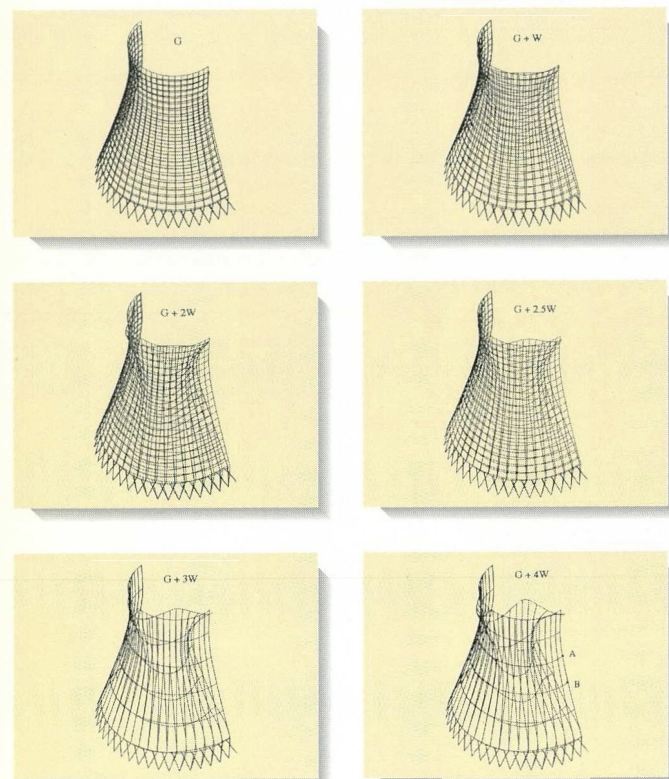
The structural safety of the cooling-tower was analysed in order to determine the critical zones for repair of the structure on the basis of the actual geometry and condition of the structure. The structure was analysed as a spatial beam system, loaded by its own weight, wind and thermal loadings. The results of the analysis produced the basis for the design of adequate and urgently needed repair works to the cooling-tower.

Numerična nelinearna termomehanska analiza 150 m visokega dimnika bloka 4 v TE Šoštanj (1996)

Namen projekta je bil ugotoviti vzroke razpok ter izbrati ustrezne poskusne rešitve sanacije dimnika. Uporabljena je bila nestacionarna, nelinearna termomehanska analiza. Za analizo je bil uporabljen naš programski paket BETHEV44, ki temelji na sočasnem reševanju dveh sistemov enačb (enačbe temperaturnega prehoda in inkrementalnih enačb mehanskega ravnotežja deformabilnih teles) znotraj izbranih časovnih intervalov. Pri nestacionarni analizi smo toplotno obtežbo opisali s časovno spremenljivo temperaturo notranje površine šamotnega zidu, ki je simulirala spremembe plina pri obratovanju dimnika. Na zunanji strani dimnika smo simulirali različne temperature zraka okrog dimnika (zimsko, poletna temperatura, delno osončen in delno v senci). Kot mehanski obtežbi pa sta bila uporabljena lastna teža in veter.

Numerical non-linear analysis of the 150 m high chimney of Block 4 of the Šoštanj Thermo-Electric Power Plant (1996)

The purpose of this project was to determine the reasons for the occurrence of cracks and the selection of an appropriate method of repair for the chimney. A transient, non-linear, thermo-mechanical analysis was performed using the software package BETHEV44, which was developed at IKPIR. This program package is based on the simultaneous solving of two systems of equations (the heat transfer equations, and the incremental equations of the mechanical equilibrium of deformable bodies) within selected time intervals. In the case of the transient analysis, the thermal load was described by taking into account the changing temperature of the chimney, which simulated the operational gas temperature changes. On the external surface of the chimney, different temperatures were simulated, corresponding to winter and summer temperatures, partial insolation and partial shading. The mechanical loadings consisted of the chimney's own weight and wind.



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funkcije na univerzi
Important Functions Held
at the University

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E. Prelog

Rector of the University:
E. Prelog

Dekan fakultete:
J. Duhovnik
P. Fajfar

Dean of the Faculty:
J. Duhovnik,
P. Fajfar

Predstojnik oddelka:
J. Duhovnik

Head of Department:
J. Duhovnik

Pomembnejša priznanja
Important Awards

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znanosti in umetnosti:
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Zaslužni profesor
E. Prelog
Izredni član Inženirske
akademije Slovenije:
F. B. Damjanić
Izredni član Hrvatske tehnične
akademije:
F. B. Damjanić
Državne nagrade za
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M. Fischinger,
E. Prelog,
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M. Fischinger,
P. Gašperšič,
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Engineering
Academy of Slovenia:
F. B. Damjanić
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Academy of Technical
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State awards for research
work:
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E. Prelog,
T. Vidic
Awards made by foreign
universities:
F. B. Damjanić,
P. Fajfar (2)
Prešeren prizes for students at
the University:
M. Cuderman,
M. Fischinger,
P. Gašperšič,
T. Vidic,
D. Žlajpah

Frano Boris Damjanić

Redni profesor za Teorijo konstrukcij in Numerične metode
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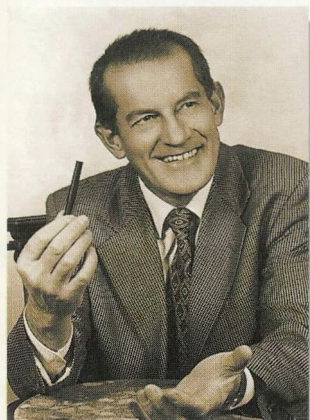


Frano Boris Damjanić (1944) se ukvarja z raziskavami na področju numeričnega modeliranja s posebnim poudarkom na razvoju in uporabi te tehnike pri praktičnih inženirskih problemih pri nelinearni konstrukcijski mehaniki, pri prednapetih betonskih konstrukcijah, potresnem inženirstvu, geomehaniki, biomehaniki, prenosu toplote in toplotno mehanski analizi stekla, plastike in metalov ter pri numeričnem modeliranju gume, plastičnih komponent in kompozitov. Napisal je okoli 160 znanstvenih in tehničnih člankov in je avtor mnogih specialističnih računalniških programov in paketov s tega področja. Kot koordinator ali sodelavec je bil vključen v več mednarodnih in domačih raziskovalnih in industrijskih projektov. F. B. Damjanić je redni profesor Univerze v Splitu, Hrvaška, in gostujoči profesor za obdobje štirih let na Univerzi v Padovi, Italija. Njegovo konsultantsko delo zajema analizo in testiranje različnih konstrukcij (npr. zgradb, športnih objektov, hladilnih stolpov, Eurotunela, itd.). Je član izdajateljskih svetov in strokovni poročevalec v več mednarodnih revijah, prav tako pa tudi član mnogih strokovnih združenj, med njimi Inženirske akademije Slovenije, Hrvaške tehnične akademije, Mednarodne zveze za računalniško mehaniko (IACM) in ASCE.

Frano Boris Damjanić (1944) has specialized in research into numerical modelling, with particular emphasis on the development and application of this technique to practical engineering problems in the fields of nonlinear structural mechanics, reinforced and prestressed concrete structures, earthquake engineering, soil mechanics, biomechanics, heat transfer and the thermo-mechanical analysis of glass, plastics and metal forming processes, and the numerical modelling of rubber and plastic components and composites. He has published over 160 scientific and technical papers, and is the author of many specialist computer programs and packages in the above fields. He has coordinated or collaborated in several international and national research and industrial projects. Frano Boris Damjanić has been appointed to the position of Professor at the University of Split, Croatia, and, for a four year period, as visiting professor at the University of Padua, Italy. His consultancy work has included a large number of projects, i.e. the design, analysis and testing of various structures (e.g. buildings, a sport stadium, cooling towers, and the Eurotunnel). He is a member of the editorial boards of several international journals. He is also a member of many professional societies (e.g. the Engineering Academy of Slovenia, the Croatian Academy of Technical Sciences, the International Association for Computational Mechanics /member of the General Council/, and ASCE.

Janez Duhovnik

Redni profesor za Mehaniko konstrukcij in
Računalniško projektiranje konstrukcij
*Professor in Mechanics of Structures and the
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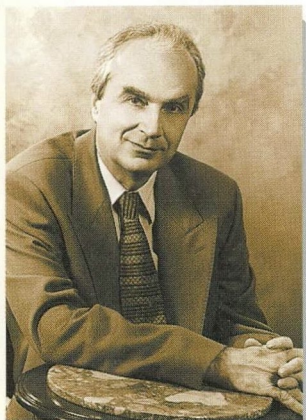


Janez Duhovnik (1942) je po diplomu na konstrukcijski smeri gradbenega oddelka FAGG leta 1965 tri leta delal pri podjetju GRADIS na gradbiščih cestnih in železniških mostov ter industrijskih objektov. Leta 1969 se je zaposlil na FAGG, kjer sedaj predava predmete Statika linijskih konstrukcij in Numerične metode na visokošolskem ter Računalniško projektiranje konstrukcij in Ekspertni sistemi na podiplomskem študiju. Bil je mentor 49 diplomantom, 5 magistrrom ter 3 doktorjem. Bil je koordinator projekta v programu TEMPUS. Pripravil in vodil je gradnjo Konstrukcijsko prometnega laboratorija in ureditev Laboratorija za računalniško projektiranje konstrukcij. Raziskoval je vpliv podajnosti stropov pri vodoravni obtežbi stavb, metode računalniškega projektiranja montažnih betonskih konstrukcij in računalniško projektiranje armature ter bil vodja več raziskovalnih projektov. Od leta 1992 je nacionalni koordinator raziskovalnega polja Gradbeništvo. Sedaj raziskuje robotizirano sestavljanje armature in sodeluje pri uvajanju Eurocode 1 ter prilagajanju drugih gradbeniških predpisov. Objavil je 103 članke in bil organizator in urednik zbornikov 17 seminarjev. Bil je odgovorni projektant 21 konstrukcij, sodeloval pa je še pri 52 projektih konstrukcij. Bil je tudi revident več projektov konstrukcij in sodni izvedenec. Bil je član komisij za oceno posledic potresov na Kozjanskem, v Črni gori in v Benečiji. Je član Slovenskega akademijskega tehniško-naravoslovnega društva. Je imetnik nagrade Rastka Stojanovića Jugoslovanskega društva za mehaniko in jugoslovanskega državnega odlikovanja zasluge za narod s srebrno zvezdo.

After graduating in 1965 at the Department of Civil Engineering of the Faculty of Architecture, Civil Engineering and Geodesy of the University of Ljubljana, as a civil engineer specializing in structures, Janez Duhovnik (1942) worked for three years for the contractor GRADIS on building-sites for road and railway bridges, and for industrial buildings. In 1969 he joined the staff of the Faculty, where he now lectures, at undergraduate level, in the Statics of Linear Structures and in Numerical Methods, and, at postgraduate level, in CAD and Expert Systems. He has acted as mentor to 49 undergraduates, 5 M.Sc. students and 3 Ph.D. students. He has been the coordinator of a project within the TEMPUS program. He prepared and was in charge of the construction of the Laboratory for Structures and Traffic, and of the establishment of the Laboratory for CAD. His research work has included studies of the influence of the flexibility of floor structures in the case of horizontal loads acting on buildings, of methods for the CAD of prefabricated concrete structures and of reinforcement, and has been in charge of a number of research projects. Since 1992 until 1996, Janez Duhovnik has acted as national coordinator for the research field of Building and Civil Engineering. At the present time he is involved in research concerning possibilities for the robotized assembly of reinforcement, and has played an active part in the implementation of Eurocode 1 and in the adjusting of other building and civil engineering technical regulations to meet the requirements of the European Union. He has published a total of 103 technical papers, and has been the editor of the proceedings of 17 seminars. He has also been the chief designer of 21 structures, and has participated in the design of a further 52 structures. He has acted as a reviewer of a number of civil engineering and building designs, and has been appointed by the courts as an expert in his field. He was a member of the teams of experts who assessed the extent of damage caused by earthquakes in Kozjansko, Montenegro, and north-eastern Italy and the Soča Valley. Janez Duhovnik is a member of the Slovenian Academic Society of Technical and Natural Sciences. He is the recipient of the Rastko Stojanović Award of the former Yugoslav Society for Mechanics, and is a holder of the Yugoslav state award "Services to the Nation, with Silver Star".

Peter Fajfar

Redni profesor za Teorijo konstrukcij in
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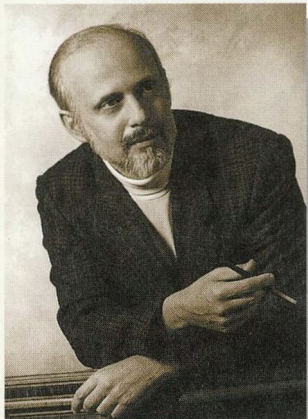


Akademik Peter Fajfar (1943) je bil eden od začetnikov uporabe računalnikov za analizo gradbenih konstrukcij v Sloveniji in bivši Jugoslaviji, kasneje pa se je posvetil potresnemu inženirstvu. Predava predmete s področij Dinamika konstrukcij in Potresno inženirstvo. Bil je mentor 61 diplomantom, 13 magistrantom in 8 doktorandom. Vodil je številne domače in mednarodne raziskovalne projekte. Njegova bibliografija obsega prek 200 del, od tega več kot 80 v mednarodnem prostoru. Imel je številna vabljenja predavanja doma in v tujini. Bil je gostujoči profesor na Univerzi v Stanfordu, McMaster Univerzi v Hamiltonu, Kanadi, Technionu v Haifi in Univerzi v Tokushimi, Japonska. Je član uredniških odborov več mednarodnih revij. Je avtor računalniškega programa EAVEK. Pozneje je kot projektant, konsultant, svetovalec ali revident sodeloval pri več kot 100 projektih, ki so zajemali predvsem statične in dinamične analize konstrukcij ter določanje projektnih potresnih parametrov. Bil je dekan FAGG, predstojnik IKPIR-a, predsednik Zveze društev za seizmično gradbeništvo Jugoslavije in predsednik slovenskega Društva za potresno inženirstvo. Poleg tega je imel še vrsto drugih zadolžitev v okviru FAGG, Univerze v Ljubljani, SAZU, Ministrstva za znanost in tehnologijo RS ter domačih in mednarodnih strokovnih združenj. Dobil je več domačih in mednarodnih priznanj, med njimi nagrado Republike Slovenije za vrhunske dosežke na področju gradbeništva.

Academician Peter Fajfar (1943) was among the first researchers to introduce the use of the computers for the analysis of building structures in Slovenia and in the former Yugoslavia, and he later devoted his studies to earthquake engineering. He lectures in the Dynamics of Structures, and in Earthquake Engineering. He has acted as mentor to 61 undergraduates, 13 M.Sc. students and 8 Ph.D. students. He has also been in charge of numerous Slovenian and international research projects. His bibliography includes more than 200 works, more than 80 of which have been published in the international literature. He has given numerous invited lectures both in Slovenia and abroad. He has been visiting professor at Stanford University, McMaster University at Hamilton, ETH of Zürich, Technion of Haifa, and the University of Tokushima. He is a member of the editorial boards of a number of international journals. He is the author of the computer program "EAVEK". As designer, consultant or reviewer, he has participated in more than 100 design projects, which have mainly dealt with the static and dynamic analysis of structures, and the determination of seismic design parameters. Peter Fajfar has been Dean of the Faculty of Architecture, Civil Engineering and Geodesy, chairman of the former Yugoslav Association of Societies for Earthquake Engineering, and chairman of the Slovenian Association for Earthquake Engineering. He has also carried out numerous other duties within the framework of the Faculty, the University of Ljubljana, the Slovenian Academy of Sciences and Arts, the Ministry of Science and Technology of the Republic of Slovenia, and various Slovenian and international professional associations. Peter Fajfar is the recipient of a number of national and international awards, including the Award of the Republic of Slovenia for outstanding achievements in the fields of building and civil engineering.

Matej Fischinger

Redni profesor za Potresno inženirstvo in
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*Professor of Earthquake Engineering and
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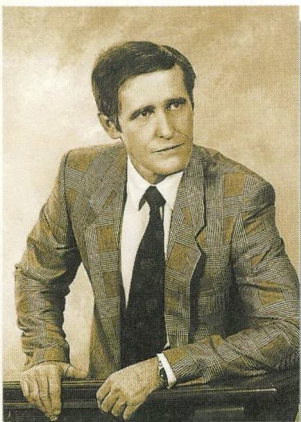


Matej Fischinger (1954) je gradbeni inženir, ki raziskuje področja neelastičnih postopkov projektiranja za potresno varno gradnjo, predpisov za konstrukcije in računalniških metod za projektiranje armiranobetonskih konstrukcij. Trenutno se ukvarja s potresno varnostjo mostov in nosilnih sten, z novimi metodologijami projektiranja v potresnem inženirstvu, ki temeljijo na predpisanem obnašanju, z redukcijskimi faktorji za potresno obtežbo, z evropskimi standardi za gradnjo konstrukcij in s projektiranjem armiranobetonskih stavb v Windows okolju. Objavil je 120 tehničnih člankov in publikacij in je imel več vabljenih predavanj v ZDA, Kanadi in Evropi. Profesor Fischinger uči predmet Masivne konstrukcije na dodiplomskem strokovnem študiju in predmet Potresno varna gradnja armiranobetonskih konstrukcij na podiplomskem študiju. Delal je kot konzultant za statično in dinamično analizo in še zlasti za potresno varno projektiranje 60 konstrukcij. Matej Fischinger je podpredsednik Slovenskega društva za potresno inženirstvo in je član Slovenskega akademijskega tehnično-naravoslovnega društva. Dobil je nagrado za raziskovalne dosežke na področju neelastičnega odziva armiranobetonskih konstrukcij na potresno obtežbo.

Matej Fischinger (1954) is a structural engineer, whose research is concerned with inelastic design procedures in earthquake resistant design, as well as with structural codes and computerized design methods for RC structures. His current interest is in the seismic resistance of bridges and structural walls, new performance-based design methodologies in earthquake engineering, seismic force reduction factors, the Eurocode, and the design of RC buildings in a Windows environment. He is the author of 120 technical papers and other publications, and has given several invited lectures in the USA, Canada and Europe. Professor Fischinger lectures the undergraduate course in reinforced concrete, and the postgraduate course in the seismic design of RC structures. He has worked as a consultant for static and dynamic analysis, and in particular for the earthquake-resistant design of 60 structures. Matej Fischinger is the vice-chairman of the Slovenian Association of Earthquake Engineering. He is a member of the Slovenian Academic Society of Technical and Natural Sciences, and is the recipient of the national award for research achievements in the field of the inelastic response of RC structures subjected to earthquake loadings.

Iztok Kovačič

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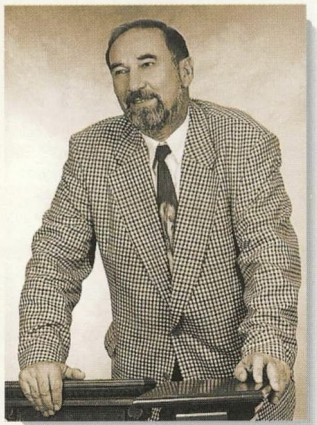


Iztok Kovačič (1945) se raziskovalno in pedagoško ukvarja z uporabo računalnikov v gradbeništvu. Bil je član skupine, ki je reševala numerične probleme na prvem tehnično usmerjenem računalniku v Sloveniji ZUSE-23. Do leta 1990 se je posvečal računalniški podpori reševanja numeričnih problemov pri računanju zemljin in konstrukcij. S sodelavcem A. Vitkom je izdelal grafično knjižnico fortranskih podprogramov. Je avtor programa za računanje upogibnih plošč. Trenutno je njegovo raziskovalno področje uvajanje objektno usmerjenih metodologij izdelave programske opreme v gradbeništvu. Razvija objektno usmerjena orodja v obliki C++ knjižnic, ki so namenjena izdelavi kompleksnih programskih sistemov za računanje in projektiranje konstrukcij. Skupaj s sodelavci je objavil 35 znanstvenih in strokovnih sestavkov. Predava predmete s področja računalništva na dodiplomskem in podiplomskem študiju in predmet Programsko inženirstvo na podiplomskem študiju.

Iztok Kovačič (1945) specializes in the software engineering aspects of computational mechanics and computer graphics. He was a member of the group that was involved in early attempts to solve numerical problems on the first engineering computer in Slovenia, ZUSE-23. He has elaborated several computer programs for solving numerical problems in the fields of soil mechanics and structures. Together with his colleague, A. Vitek, he designed and implemented the general Fortran graphics subroutine library P. He is the author of a computer program for the analysis of plates. He is currently focusing his research on the introduction of object-oriented tools in the form of C++ class libraries, which support the development of integrated computer systems in structural engineering. He has published by himself or with coauthors 35 technical reports and papers. He lectures the undergraduate courses in computing at the Department of Civil Engineering, as well as Automatic Data Processing at the Department of Geodesy, and a postgraduate course in software engineering.

Janez Reflak

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Janez Reflak (1937) je predstojnik IKPIR-a. Predava predmete s področja ploskovnih konstrukcij na dodiplomskem in podiplomskem študiju gradbeništva. Bil je pobudnik za ustanovitev in prvi predstojnik Inštituta. V začetku je raziskoval uklon in elastoplastični upogib tlačjenih palic, nato pa se je ukvarjal z uporabo računalnika pri statični in dinamični analizi linijskih in ploskovnih konstrukcij. V letih 1984-89 je kot direktor Inštituta za metalne konstrukcije vodil strokovno in raziskovalno delo tega inštituta. Po vrnitvi na fakulteto leta 1990 je raziskoval vpliv polnil in montažnih parapetov pri statični in dinamični obtežbi okvirnih konstrukcij, proučeval je tudi uporabnost metode podkonstrukcij pri analizi okvirov s polnili. V istem času je raziskoval tudi vpliv širine podpor in njihove podajnosti na statične količine pri ploščah. Zadnje čase je delal na področju zagotavljanja kakovosti v gradbeništvu. Objavil je 56 člankov in referatov v domovini in delno v tujini. Sodeloval je pri 34 raziskovalnih projektih, nekatere izmed njih je tudi vodil. Za gradbeno prakso je s sodelavci opravil 8 razvojnih študij in 72 statičnih projektov ter 169 recenzij projektov. Je mentor diplomantom na dodiplomskem in podiplomskem študiju ter mentor pri strokovnih izpitih gradbenih inženirjev.

Opravlja številne funkcije na Fakulteti in Univerzi. Med drugim je član Upravnega odbora Univerze v Ljubljani, član strokovne komisije za strokovne izpite pri Gospodarski zbornici Slovenije, predsednik Tehničnega odbora za konstrukcije pri Zavodu za standardizacijo Slovenije in predsednik strokovnega sveta Družbe za raziskave v cestni in prometni stroki Slovenije.

Janez Reflak (1937) is the head of IKPIR. He lectures in the Theory of Plates and Shells at the undergraduate and postgraduate levels of the civil engineering curricula. He was the main founder of IKPIR, and he was its first head. Initially Janez Reflak investigated the problems of the stability and elastoplastic bending of beam-column element and later became concerned with the use of the computer for the static and dynamic analysis of linear structures, and of plates and shells. During the period 1984-89 he was the director of the Institute for Metal Structures, where he was in charge of the technical and research work of that institute. After returning to the Faculty in 1990, he carried out research into the influence of infill walls and precast parapet walls in the case of static and dynamic loads acting on framed structures, and also into the use of the method of substructures when analysing frames with infill walls. At the same time he also undertook research into the influence of the width of supports and of their flexibility on the static quantities in slabs. Recently Janez Reflak has been concerned with the field of quality assurance in building and civil engineering. He has published 56 articles in journals and other technical papers, both in Slovenia and in other countries. He has been in charge of 34 research projects. For the needs of civil engineering practice, he has, together with his colleagues, carried out 8 developmental studies and 72 static designs. He has also been engaged in the reviewing of as many as 169 design projects. He acts as a mentor to both undergraduate and postgraduate students, as well as in the case of the professional examinations which are undertaken by graduate civil engineers.

Janez Reflak has assumed many functions at both Faculty and University level. Amongst them, he is a member of the Administrative Board of the University of Ljubljana, a member of the expert committee for professional examinations which is established at Slovenia's Board of Commerce, chairman of the Technical Committee for Structures at Slovenia's Standards and Metrology Institute, and chairman of the technical council of Slovenia's Society for Research in Roads and Traffic Studies.

Žiga Turk

Docent

Assistant Professor

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Žiga Turk (1962) je diplomiral in doktoriral na FGG, magistriral pa na Fakulteti za računalništvo in informatiko. Predava predmeta Računalnik v arhitekturi in Opisna geometrija, ki vključuje tudi risanje z računalnikom. Raziskuje na področju gradbene informatike, kjer ga zanima računalniško integrirana gradnja, kompjuterizacija predpisov in standardov, elektronsko upravljanje s tehnično dokumentacijo, inženirske zbirke podatkov, informacijski sistemi, modeliranje procesov in produktov ter komunikacije. V angleškem jeziku je objavil 30 člankov v revijah in zbornikih znanstvenih srečanj, v slovenščini pa prek 150 strokovnih in poljudno strokovnih člankov ter dve knjigi. V osemdesetih je bil ustanovni urednik revije Moj mikro. Žiga Turk je sourednik mednarodne znanstvene revije »Electronic Journal of Information Technology in Construction«, so-predsedujoči delovne skupine CIB za informatiko v gradbeništvu in član slovenskega odbora za standardizacijo na področju tehnične dokumentacije. Od leta 1993 ureja nekaj dobro obiskanih servisov na svetovnem spletu WWW, ki so namenjeni predvsem sodelovanju med raziskovalci. V letu 1996 je organiziral mednarodno delavnico »Construction on the Information Highway«.

Žiga Turk (1962) holds degrees in structural engineering and computer science from the University of Ljubljana. As an assistant professor, he lectures descriptive geometry (including CAD,) and a course on computers in architecture. His research topic is construction information technology, especially computer integrated construction, the computerization of building regulations, electronic data management, engineering databases, product and process modelling, technical information systems and communication technology. In English, he has published 30 conference and journal papers, and has given invited lectures in Sweden, the UK and Germany. In Slovenian, he has published two books on the C and C++ languages, and over 150 research reports, technical papers and articles. Žiga Turk is the co-editor of the international peer-reviewed scientific journal "Electronic Journal of Information Technology in Construction", and has taken the co-chair of CIB's Working Commission on Information Technology in Construction. He is also a member of the national standardization committee on technical documentation. Since 1993, he has provided several frequently-visited services for the international research community on the Internet and the World Wide Web. In 1996 he organized a workshop entitled "Construction on the Information Highway".

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dipl. gradb. inž.
dr. Dejan Žlajpah,
dipl. gradb. inž.

V obdobju 1971 do 1996 so bili v IKPIR-u
zaposleni s polnim ali s skrajšanim delovnim časom /
Between 1971 and 1996 the following were,
for shorter or longer periods,
full-time or part-time members of the staff of IKPIR:

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mag. Alojz Bevc, dipl. gradb. inž.,
dr. Boštjan Brank, dipl. gradb. inž.,
mag. Mladen Bratovič, dipl. gradb. inž.,
Zdene Breška, prof. mat.,
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Dejan Žužek.

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