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KATEDRA ZA KONSTRUKCIJE IN
POTRESNO INŽENIRSTVO

Na KKPI se ukvarjamo z različnimi vidiki projektiranja gradbenih konstrukcij, predvsem s poglavitno funkcijo, ki jo ta postopek mora zagotoviti, to je zagotavljanje stabilnosti in varnosti gradbenih konstrukcij pri različnih vplivih s posebnim poudarkom na potresni obtežbi.

Raziskovalna in strokovna dejavnost

Na KKPI se ukvarjamo z raziskavami in razvojem naprednih metodologij in orodij za analizo in projektiranje konstrukcij, še posebej smo aktivni na področju potresnega inženirstva. Ponašamo se z dolgoletnim uspešnim sodelovanjem z najbolj uglednimi institucijami na svetu, kot so npr. ENS Cachan, Univerza v Tokiu, Univerza v Stanfordu, UC Berkeley in laboratorij ELSA v Ispri.

Glavna področja našega raziskovanja so sodobne metode za analizo in projektiranje najbolj kompleksnih vrst konstrukcij ter razvoj teoretičnih osnov in aplikativnih metod in orodij za potresno zaščito konstrukcij. Temeljne raziskave so bile vedno osnova za nadaljnje aplikativne študije, ki so botrovale številnim družbeno pomembnim dosežkom. Tako so rezultati naših dosedanjih raziskav in ekspertiz bistveno pripomogli k povečanju potresne varnosti številnih zelo pomembnih objektov, kot so npr. nuklearne elektrarne, pomembni viadukti in nakupovalna središča. Družbeno pomembne so bile tudi raziskave bolj običajnih tipov konstrukcij, ki se uporabljajo vsakodnevno, kot so npr. stanovanjske stavbe in industrijski objekti.

Zelo tesno sodelujemo z različnimi podjetji v Sloveniji in tujini. Rezultati tega sodelovanja so številni novi in izboljšani postopki projektiranja za različne tipe gradbenih konstrukcij. Veliko pozornosti namenjamo razvoju in uporabi novih tehnologij (npr. potresni izolaciji) in novih, okolju prijaznih materialov pri izboljšavah potresne varnosti različnih konstrukcij.

Dejavno sodelujemo pri razvoju in implementaciji evropskih standardov v projektantsko prakso. V letih 2016 in 2017 so bili člani naše katedre na razpisu CEN TC 250 uradno vključeni v delovne skupine za nadaljnji razvoj skupnih evropskih standardov za projektiranje na potresnih področjih Evrokod 8/1 in Evrokod 8/3. V predlog novih verzij teh standardov so vključene tudi metodologije in postopki, ki smo jih razvili na KKPI v okviru svojega raziskovalnega dela. Na ta način smo pomembno prispevali k potresni varnosti ne samo v Sloveniji, pač pa tudi širše v Evropi.

CHAIR FOR STRUCTURAL AND
EARTHQUAKE ENGINEERING

Members of the Chair are dealing with various aspects of structural design, in particular with the main function this procedure has to ensure, i.e. stability and safety of structures, with special emphasis on earthquake load.

Research and professional activity

The Chair is involved in research in the field of advanced methodologies for structural analysis and design, in particular in the field of earthquake engineering. A strong collaboration network has been established with the most eminent institutions worldwide, e.g. ENS Cachan, University of Tokyo, Stanford University, UC Berkeley and ELSA Laboratory in Ispri.

The main thematic focus areas of the research are advanced analysis and design techniques for the most complex structures, as well as the development of the theoretical background, applied analysis and tools for seismic protection of structures. The fundamental research is typically conducted to provide the basis for further applied studies, the results of which are placed to the service of society. The results and expertise obtained so far have improved the seismic safety of structures of utmost importance, such as nuclear power plants, main viaducts and shopping centres. The conducted research devoted to more common and more numerous structures, such as residential and industrial building stock, is of particular social relevance as well.

Strong partnership has been established with the industry in Slovenia and abroad. The cooperation has resulted in new and improved design techniques for different types of structures. Significant attention is devoted to the development and application of the new technologies (e.g. seismic isolation) and new environment-friendly materials for the improvement of seismic safety of different types of structures.

We are actively involved in the development and implementation of the relevant European norms and their application to design practice. In 2016 and 2017, the members of our Chair were officially included at the public tender of CEN TC 250, in the work groups for further development of European norms for the design at seismic areas, Eurocode 8/1 and Eurocode 8/3. The proposal of the new versions of these norms includes also methodologies and procedures developed by the members of our Chair within their research work. In this way, we considerably contributed to the seismic safety not only in Slovenia, but also in the wider European area.

Educational activities

Members of the Chair provide courses at all levels of study at different thematic areas. The courses deal with various areas that are tightly linked to our research and professional work: dynamics of structures and earthquake engineering, design and non-linear analysis of buildings and bridges in seismic areas, reliability analysis in earthquake engineering, analysis of slab and shell structures, finite element analysis, interdisciplinary IT supported design of structures, etc.

Our study programs are clearly focused and they meet the highest standards. The courses' curricula are constantly upgraded to provide the students the information of the recent advances in the field. Innovative and up-to-date teaching methods and tools are used. We were among the pioneers who introduced the multidisciplinary project based IT supported study of design of structures. For this advanced teaching approach, we were awarded by the Faculty of Education at the University of Ljubljana.

The best students are given the opportunity to be involved into research projects as postgraduate students funded by the Ministry of Education, Science and Sport of the Republic of Slovenia. Many of them have outstanding professional careers and take high positions in the profession and society.

Exceptional achievement

Academician, Prof. Dr. Peter Fajfar, for many years Head of the Chair for Structural and Earthquake Engineering, founder and for many years leader of the research group Earthquake Engineering, received the highest national and international awards for his research work, which is, as he always says, intertwined with the activities of the whole research group. The highest possible award at the national level is the Zois award that he received in 2015. As written in the justification of the award, »Peter Fajfar founded the contemporary earthquake engineering in Slovenia and with his achievements he contributed considerably that this field of science became one of the most prominent areas in Europe and in the world«. Let us also mention that in its many years of existence only four representatives of engineering sciences have so far received this prestigious award in the field of science, which increases the importance of this achievement even further.

Pedagoška dejavnost

Na KKPI predavamo predmete na vseh stopnjah študija in različnih smereh. Predmeti se nanašajo na različna področja, tesno povezana z našim raziskovalnim in strokovnim delom: dinamika konstrukcij in potresno inženirstvo, projektiranje in nelinearna analiza stavb in mostov na potresnih področjih, zanesljivost konstrukcij v potresnem inženirstvu, analiza ploskovnih in lupinastih konstrukcij, metoda končnih elementov, interdisciplinarni projektni študij računalniško podprtega projektiranja konstrukcij itd.

Naši študijski programi so jasno opredeljeni in izpolnjujejo najvišje standarde. Učne vsebine nenehno razvijamo in izpopolnjujemo ter tako študente seznanjamo z najnovejšimi dosežki na področjih, ki jih obravnavajo naša predavanja. Pri tem uporabljamo najsodobnejše tehnike in orodja za poučevanje. Tako smo med prvimi vpeljali interdisciplinarni projektno orientirani študij, podprt z najsodobnejšimi orodji informacijske tehnologije. Za ta inovativni pristop k poučevanju smo prejeli nagrado Pedagoške fakultete Univerze v Ljubljani.

Najboljšim študentom omogočamo, da se kot mladi raziskovalci, ki jih financira Ministrstvo za izobraževanje, znanost in šport Republike Slovenije, vključijo v raziskovalno delo na različnih projektih. Mnogo med njimi jih je ustvarilo izjemne poklicne kariere in so zasedli pomembne položaje v stroki in v družbi.

Izjemni dosežek

Dolgoletni predstojnik KKPI, ustanovitelj in dolgoletni vodja raziskovalne skupine »Potresno inženirstvo«, akad. prof. dr. Peter Fajfar, je prejel najvišja nacionalna in mednarodna priznanja za raziskovalno delo, ki je, kot sam vedno poudarja, vtakano v aktivnosti cele raziskovalne skupine. Najvišje možno priznanje na nacionalni ravni je Zoisova nagrada, ki jo je prejel v letu 2015. Kot je bilo zapisano v obrazložitvi nagrade, »je Peter Fajfar utemeljil sodobno potresno inženirstvo v Sloveniji in s svojimi dosežki odločilno prispeval, da se je ta veja znanosti povzpela v najožji evropski in svetovni vrh.« Omenimo, da so to prestižno nagrado na področju znanosti v njenem dolgoletnem obstoju prejeli le štirje predstavniki inženirskih ved, kar še bolj poudarja pomen dosežka.



Akademik prof. dr. Peter Fajfar, Zoisov nagrajenec za življenjsko delo
Academician, Prof. Dr. Petr Fajfar, Zois Prize Winner for Lifetime Achievement