

PREDGOVOR

Savetovanje/Simpozijum Energetska elektronika obeležava 50 godina od svog prvog okupljanja u Beogradu daleke 1973. god. Ova duga tradicija pokazuje da je zajednica energetske elektronike u Srbiji aktivnai da ima značajne rezultate, vredne širom sveta. Prva konferencija održana je na srpskom jeziku kao savetovanje, a prezentovano je 47 referata iz bivše Jugoslavije. Uvedena je popularna naslovna skraćenica Ee(od Energetska elektronika). Sledeće konferencije održane su u Beogradu 1975. god. sa 50 referata, Zagrebu 1978. god. sa 94 rada, Sarajevu 1981. god. sa 95 referata, Ljubljani 1984. god. sa 104 rada, Subotici 1986. god. sa 126 referata i Beogradu 1988. god. sa 109 referata.

Posleduže pauze, usled nemilih događaja i raspada Jugoslavije, Energetska elektronika je oživela i nastavila 1995. god. u Novom Sadu, sa 79 radova. Počeo je kao naučni simpozijum sa izložbom, pa je za mesto održavanja izabran Međunarodni sajam elektronike i informatike Sledećisimpozijumi održanis u Novom Sadu 1997. god. sa 98 referata i 1999. god. sa 82 rada. Značajno učešće stranih autora rezultiralo je nadogradnjom simpozijuma u međunarodni, koji je 2001. god. okupio 107 radova, 2003. god. 101 rad, 2005. god. 94 rada, 2007. god. 101 rad, a 2009. god. 105 radova. Simpozijum je 2011. god. uključen u novu manifestaciju šireg obima „Dani energije” u Master konferencijskom centru Novosadskog sajma i privukao je102 rada, dok je Ee2013 imao 69 radova Međutim učešće industrije na izložbi je oslabilo, pa je odlučeno da se mesto održavanja premesti na univerzitet Sledećj Ee 2015 simpozijum održan je u Centralnoj zgradi Univerziteta u Novom Sadu, na kome je prezentovan 71 rad.

19. Međunarodni simpozijum o energetskoj elektronici Ee 2017 organizovan je po standardima vrhunske svetske naučne konferencije. Bio je to prvi tehnički kosponzorisan od IEEE Power Electronics Society (PELS) and IEEE Industrial Electronics Society (IES), the European Power Electronics (EPE) Association, i od the European Centre for Power Electronics (ECPE), kao i od IEEE Serbia and Montenegro Section and IEEE Joint Chapter PELS/IES/IAS of Serbia and Montenegro Section. Ovo snažno angažovanje IEEE donelo je promene u procesu pregleda i prihvatanja radova, koji su obavljani po IEEE standardima, pa je predstavljeno 75 radova i predavanja 248 autora iz 29 zemalja. Svi predstavljeni radovi su uključeni u IEEE Xplore bazu podataka i citirani u bazama Web of Science, Scopus i Google Scholar. 20. jubilarni simpozijum nastavljen uz IEEE tehničko kosponzorstvo i uz uključnje IEEE Industry Application Society, Ee 2019, okupio je u Novom Sadu 73 rada i predavanja, koje je napisalo 235 autora i koautora iz 23 zemlje. Nedavna pandemija virusa COVID-19 2020. god. i tada uvedena ograničenja putovanja, primorali su Organizacioni odbor da 21. međunarodni simpozijum o energetskoj elektronici - Ee 2021 organizuje u virtuelnoj formi (online). Ipak, 234 autora iz 27 zemalja pripremila je ukupno 81 rad i predavanja.

Godina 2023. donosi još jedan jubilej, 50 godina od prve konferencije. Organizacioni odbor 22. međunarodnog simpozijuma o energetskoj elektronici Ee 2023 odlučio je da unese neke izmene u organizaciji. Konferencija se po prvi put organizuje na dve lokacije, u Beogradu u Srpskoj akademiji nauka i umetnosti (SANU) i u Novom Sadu u salama Naučno-tehnološkog parka (NTP). Ideja je bila da se oda počast osnivačima Ee simpozijuma, srpskim akademikima, profesorima i naučnicima, pa je otvaranje, proslava jubileja i deo uvodnih predavanja zakazan u Svečanoj sali SANU u Beogradu, kao i da se oživi učešće vrhunskih tehnoloških kompanija, pa je naučni deo i ponovo oživljena izložba organizovana u salama i atrijumu NTP u Novom Sadu. Simpozijum je okupio 88 radova i predavanja (55 vrhunskih radova, uključujući 4 pozvana i 1 Keynote referat, 6 Keynote predavanja, 2 pozvana predavanja, 15 industrijskih prezentacija, 3 tutorijala, 1 istaknuto predavanje i 6 radovana nacionalnom savetovanju), koji su napisani od 280 autora i koautora iz 24 zemlje. Svi radovi su prošli kroz process dvostruke “slepe” revizije od strane Međunarodnog programskog komiteta i tehničkog prilagođavanja od strane Sekretarijata. Od 67 pristiglih radova za međunarodni simpozijum, 55 (82%) je prihvaćeno za predavljanje na uvodnim, pozvanim i redovnim sesijama. Pored toga, organizovane sui tri industrijske sesije, jedno predavanje uglednog profesora i tri tutorijala.

Ovom prilikom želim da odam priznanje za veliki rad i trud kopredsedavajućinsimpozijuma prof. Dušanu Borojeviću sa Virginia Tech, SAD, i akademiku prof. Slobodanu Vukosaviću iz SANU/Univerzitet u Beogradu, te prof. dr Miroslavu Vasiću sa Politehničkog univerziteta u Madridu Španija prof. Aleksandru Prodićusa Univerziteta u Torontu, Kanada, dr Žarku Jandi iz Elektrotehničkog Instituta Nikola Tesla, Srbija, prof. Jeleni Popovićsa Univerziteta Tvente, Holandija i dr. Dušanu Graovcu iz Infineon Technologies, Nemačka/Austrija, koji su okupili veliki tim stručnjaka za energetsku elektroniku kao voditelje tema i recenzente, pozvali poznate uvodničare i vrhunske predavače i organizovali tutorijale, što je rezultiralo visokim kvalitetom programa simpozijuma Takođe zahvaljujemi prof Aleksandru Stanisavljeviću koji je uspeo da prođe kroz složenu procedure pripreme osnova za uvrštavanje svih prezentovanih radova u IEEE Xplore digitalnu biblioteku, te Web of Science, Scopus i Google Scholar baze citiranja. Njihov rad je veoma cenjen.

Predstavljeni radovi prikazuju najnovije rezultate istraživanja, nove tehnologije i trendove, kao i dostignuća industrije. Na Simpozijumu je da proceni značaj ovih doprinosa. Za tačnost rezultata, iskaza i zaključaka odgovorni su sami autori.

Paralelno, održava se XXII Savetovanje Energetska elektronika (na srpskom jeziku) i godišnja skupština Društva za energetsku elektroniku Srbije.

Prof. dr Vladimir Katić
Predsedavajući simpozijuma Ee 2023 i Predsednik Društva za
Energetsku elektroniku Srbije

FOREWORD

The Power Electronics Symposium is celebrating 50 years from its first gathering in Belgrade way back in 1973. This long tradition shows that the power electronics community in Serbia is active and has significant results, valuable worldwide. The first conference was held in the Serbian language as a national one, and 47 papers from all over ex-Yugoslavia were presented. It introduced the popular title abbreviation **Ee** (abbreviated from the Serbian name *Energetska elektronika*). The next conferences were held in Belgrade in 1975 with 50 papers, Zagreb in 1978 with 94 papers, Sarajevo in 1981 with 95 papers, Ljubljana in 1984 with 104 papers, Subotica in 1986 with 126 papers, and Belgrade in 1988, with 109 papers.

After a long break, due to unfortunate events in ex-Yugoslavia, Power Electronics revived and continued in 1995 in Novi Sad, with 79 papers. It started as a scientific symposium with an exhibition, so for the venue, the International Fair on Electronics and Informatics was chosen. The next symposiums were held in Novi Sad – in 1997, with 98 papers, and in 1999, with 82 papers. Significant participation of foreign authors resulted in an upgrade of the symposium into an international one, which in 2001 gathered 107 papers, in 2003 101 papers, in 2005 94 papers, in 2007 101 papers, and in 2009 105 papers. In 2011 the symposium was included in the new wider-scope event „Energy Days” in the Master Conference Center of Novi Sad Fair and attracted 102 papers in 2011 and 69 papers in 2013. However, the industry participation at the exhibition weakened, so it was decided to move into academia. The next, 2015 symposium was held in the Central Building of the University of Novi Sad, where 71 papers have been presented. The average number of participants was between 150 and 200 of which a significant portion were students and industry experts.

The 19th International Symposium on Power Electronics *Ee 2017* was organized according to the standards of the top World scientific conference. It was the first one technically co-sponsored by the IEEE Power Electronics Society (PELS) and IEEE Industrial Electronics Society (IES), the European Power Electronics (EPE) Association, and the European Centre for Power Electronics (ECPE), as well as by IEEE Serbia and Montenegro Section and IEEE Joint Chapter PELS/IES/IAS of Serbia and Montenegro Section. This strong involvement of IEEE brought changes in the paper review and acceptance process, which were performed according to IEEE standards, so 75 papers and lectures by 248 authors from 29 countries were presented. All presented papers were included in the IEEE Xplore database and cited in Web of Science, Scopus, and Google Scholar. The 20th jubilee symposium continued with IEEE technical sponsorship and included the IEEE Industry Application Society, as well. It gathered at *Ee 2019* in Novi Sad 73 papers and lectures, which were written by 235 authors & co-authors from 23 countries. The famous pandemic virus COVID-19 in 2020 and the travel restrictions introduced at that time, forced the Organizing Committee to organize the 21st International Symposium on Power Electronics *Ee 2021* in virtual form (online). Still, 234 authors from 27 countries prepared in total 81 papers and lectures.

The 2023 brings another jubilee, 50 years from the first conference. The Organizing Committee of the 22nd International Symposium on Power Electronics – *Ee 2023* decided to bring some changes to the organization. For the first time, the conference is organized at two locations, in Belgrade at the Serbian Academy of Sciences and Arts (SASA) and in Novi Sad at the halls of the Science and Technology Park (STP). The idea was to make a tribute to the founders of the *Ee* symposiums, Serbian academicians, professors, and scientists, so the opening, jubilee celebration, and some Keynotes are scheduled in the Ceremonial Hall of the SASA in Belgrade, and to revive the Hi-Tech industry participation, so the scientific part and reestablished exhibition are programmed in the Halls and Atrium of the STP in Novi Sad. The symposium gathered 88 papers and lectures (55 top-quality papers including 4 invited and 1 Keynote paper, 6 Keynote lectures, 2 invited lectures, 15 industry presentations, 3 tutorials, 1 distinguished professor lecture, and 6 papers at national conference) prepared by 280 authors and co-authors from 24 countries. All papers have passed through a double-blind reviewing process by the International Program Committee and technical adjustment by the Secretariat. From 67 submitted full papers for the international symposium, 55 (82%) have been accepted and will be presented in Keynote, Invited, and Regular sessions. Additionally, three industry sessions, one distinguished professor lecture, and three tutorials will be organized.

I would like to acknowledge the great work of the symposium co-chairs Prof. Dushan Boroyevic, from Virginia Tech, USA, and Academician Prof. Slobodan Vukosavic, from SASA/University of Belgrade, Serbia, the symposium Technical Chairs Prof. Miroslav Vasic, from the Universidad Politecnica de Madrid, Spain, Prof. Aleksandar Prodic, from University of Toronto, Canada, Dr. Zarko Janda, from Electrical Engineering Institute Nikola Tesla, Serbia, Prof. Jelena Popovic, from University of Twente, The Netherlands and Dr. Dushan Graovac, from Infineon Technologies, Germany/Austria, who gathered a large team of power electronics experts as topic chairs and reviewers, invited famous key-note speakers and high expert presenters and organized the tutorials, which resulted in high quality of the symposium program. Also, the Publication Chair Prof. Aleksandar Stanisavljevic managed to go through a complex procedure of preparing fundamentals for post-conference inclusion of all presented papers in the *IEEE Xplore* digital library and *Web of Science*, *Scopus*, and *Google Scholar* citation bases. Their work is highly appreciated.

The presented contributions show the latest research results, new technologies, and trends, as well as achievements of the industry. It is to the Symposium to evaluate the significance of these contributions. The authors themselves are responsible for the accuracy of the results, statements, and conclusions.

As parallel events, the XXII National Conference *Energetska elektronika* (in the Serbian language) and the annual assembly of the Serbian Power Electronics Society will be held.

Prof. Dr. Vladimir Katić

Ee 2023 Chairman &
President of the Serbian Power Electronics Society