

## Some Thoughts About 6<sup>th</sup> Student Competition organised by EnLAB and our Partners

At the early beginning of this contribution, I would like to express my great gratitude to the complete organizing committee of the 6<sup>th</sup> Student Competition on Digital Power System Simulations and especially to select me as a member of the Jury. It has been a really great pleasure and experience to look into all contributions prepared by students, studying electrical power systems on different levels within the number of Russian universities.

I participated so far on all competitions and as a first conclusion I would like to point out that the quality of presented works as well as use of digital power system simulators, operating in real time (simulator from RTDS Technologies, Canada) as well as of-real time (PSCAD from Manitoba Hydro International, Canada) increase continuously. This is related also to studies and simulation of renewable energy and distributed generation with power electronic, which includes between other with real time simulators also 4Q amplifiers (Ponovo Power, China) and direct connections to real power system. I am really convinced that such approach contributes and will contribute even more to the future development of Russian power system and its reliable operation under more demanding operating conditions.

Power system simulation is in fact nothing new. It has been used practically from the very beginning of world electrification and improved with time. Here I would like to mention two examples. One of them is electromechanical simulator in St. Petersburg, known as NIPT simulator. This was (and still is) the biggest electromechanical simulator in the world, where some of the biggest developments of the world power systems have been performed. Somewhere in eighties of last century an electronic power system simulator, used for development of relay protection devices, has been developed and used by ABB Relays in Sweden. What is also interesting for this simulator is a fact, that it has been designed based on Clarke components.

And of course, development of computers, digital technologies and especially algorithm, as developed by Hermann Dommel, which presents all power system elements as equivalent current sources and resistors have made it possible to develop a real time digital simulator (by today's RTDS Technologies) already in 1989 for simulation of HVDC converters and power lines. What is also important is that students within our competition perform their work on Dommel bases real and non-real time power system digital simulators.

Most of respected experts all around the world agree today that development of modern power system is practically impossible without modern power system simulators. Here is of cause not possible to forget the basic laws (like Ohm's, Kirchhoff's, etc), but the modelled systems are too big and complex to be studied just by classical calculation tools. Also, electromechanical models are getting extremely big and complex, not to forget on the time, required for preparing a complete model – from months for electromechanical to days or maybe a week for digital model.

All this presents a number of reasons, why is necessary to move towards the use of digital power system simulators as an important tool for young power system engineers. They should learn their basic characteristics and the ways how to use them in their everyday professional life. This was one of the main reasons that EnLAB together with its partners started Student Competition on Digital Power System Simulators already in 2018. Number of participants has from that time increased significantly as well as the quality of their contributions.

I am sure that we will continue with this competition even next and many more years in coming future. At the same time, I would like to congratulate all participants of 6<sup>th</sup> competition and especially winners on different levels. And of course, I wish to all of them successful work on simulators also in their professional future.