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## Optimization and Safety of Electrical System and Hydro Plants Safety

**December 11 @ 6:45 pm - 8:30 pm \$7**

The last century economy of power plants design had implied that turbines' maximum efficiency was at lower outputs than the rated one which is the maximum output. If the grid is optimized to produce at the best efficiency, which leads to the lowest price, then the difference between the generated and rated power of all units in operation will be an essentially free, spinning reserve. Most generators have a 10% overload for a short period of time. The spinning reserve will stabilize the market, and the production costs will not only be reduced but there will be fewer variable, and the grid will be protected from the blackouts. Furthermore, the aging of turbines and generators is minimized due to minimal vibrations achieved at the maximum efficiency, which provides profit increase.

Our recent computer calculations discovered "S" form real and mathematical instability in pumps and pump turbines. The cases included in this presentation will show the consequences and importance of safety at all times. This presentation will focus on describing (i) optimization of the grid that leads to the cleaner electricity, (ii) free, spinning reserve, and (iii) the lowest price of electricity production.

Stresses and accidents are always observed in the transient conditions, such as waterhammer, vibrations, resonance, etc. and, therefore, the transient analyses are inevitable and must be carried out by qualified, experienced experts. The real instabilities influence the mathematical approach to the transient conditions, thus decreasing the accuracy of modeling. Transient states, such as start, stop, load rejection, over speed, runaway, etc., are crucially important, and must be considered in the models, along with vibrations in the "steady" state condition of generating units (thermal and hydraulic turbines, reversible pump-turbines). For example, one start and stop of a unit is often equivalent to the aging of 10 hours of the normal operation.

Increasing the use of power produced by wind, solar and other unmanageable sources of energy, increase the severity of hydro unite transients and is typically neglected in the grid optimization. Knowing that the 99% of electricity storage is in the water reservoirs of hydroelectric and pumped storage plants, points out to the importance of the transient analyses. This means that the last century design of power plants requires additional transient analyses to verify their safe operations.

Presenter Bio: Prof. Stanislav Pejovic, Ph.D., P.Eng., Expert International Chamber of Commerce, is Professor Emeritus at the University of Belgrade, Serbia. Presently he is a part time professor at the University of Toronto and Ryerson University. He is the author of recently published book “The Rules for Hydraulic Transient Design Analysis – Guide for Designers and Manufacturers – Recommendations for Investors and Managers”, 2018, (S. Pejovic and A Gajic), and a White Paper on Hydro Energy Storage, Faculty of Engineering, Architecture and Science Centre for Urban Energy, Ryerson University, Toronto, 2011.

Pizza, cookies, coffee and soft drinks will be provided.

Registration opens at 6:45 pm. Presentation will start at 7 pm.

<b>Details</b> <b>Date:</b> December 11 (2018-12-11) <b>Time:</b> 6:45 pm - 8:30 pm <b>Cost:</b> \$7 <b>Register Here:</b> <a href="https://www.eventbrite.ca/e/optimization-and-safety-of-electrical-system-and-hydro-plants-safety-tickets-52856040841">https://www.eventbrite.ca/e/optimization-and-safety-of-electrical-system-and-hydro-plants-safety-tickets-52856040841</a> ( <a href="https://www.eventbrite.ca/e/optimization-and-safety-of-electrical-system-and-hydro-plants-safety-tickets-52856040841">https://www.eventbrite.ca/e/optimization-and-safety-of-electrical-system-and-hydro-plants-safety-tickets-52856040841</a> )	<b>Organizer</b> Jie Dong, Ph.D., P.Eng. <b>Email:</b> <a href="mailto:jie.dong@peo-mc.ca">jie.dong@peo-mc.ca</a>
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<b>Venue</b> South Common Community Centre, “Arbour Green Room” 2233 South Millway Mississauga, Ontario (Ontario) L5L3H7 Canada + Google Map ( <a href="https://maps.google.com/maps?f=...">https://maps.google.com/maps?f=...</a> ) <b>Phone:</b> 905-615-4770 <b>Website:</b> <a href="http://www.mississauga.ca/portal/residents/south">http://www.mississauga.ca/portal/residents/south</a> ( <a href="http://www.mississauga.ca/portal/residents/south">http://www.mississauga.ca/portal/residents/south</a> )	
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