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DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

TITLE OF THESIS:	NEW EVOLUTIONARY ALGORITHMS AND THEIR APPLICATION TO ELECTRIC POWER SYSTEM OPERATIONAL ENGINEERING
TIME/DATE:	3:00pm, Thursday, September 14, 2017
PLACE:	Room 3107, Mona Campbell Building, 1459 LeMarchant Street, Halifax Nova Scotia

EXAMINING COMMITTEE:

Dr. Magdy Salama, Department of Electrical & Computer Engineering, University of Waterloo (External Examiner)

Dr. Jason Gu, Department of Electrical & Computer Engineering, Dalhousie University (Reader)

Dr. William Phillips, Department of Engineering Math & Internetworking, Dalhousie University (Reader)

Dr. Mohamed El-Hawary, Department of Electrical & Computer Engineering, Dalhousie University (Supervisor)

DEPARTMENTAL REPRESENTATIVE:	Dr. Jacek Ilow, Department of Electrical & Computer Engineering, Dalhousie University
CHAIR:	Dr. Peter Duinker, PhD Defence Panel, Faculty of Graduate Studies

ABSTRACT

In this research work, models will be developed for optimal dispatch problems applied in a smart grid environment. The models will be used to solve optimal dispatch problems and other problems such as optimal power flow, unit commitment, and short term hydrothermal scheduling for a smart grid environment. The main objectives of smart grid include the optimization of energy production, minimization of the production cost, integration of renewable energy resources and implementation of real time pricing and billing. Each problem will be affected by the objectives of the smart grid and the tools used to implement these objectives such as demand side management (DSM) and load forecasting. There are many constraints in the problems treated such as generators capacity, ramp rate limit, and prohibited operational zones. This research will define the changes in all these constraints. There is also the problem of valve point effects for thermal driven units which will change the fuel cost equation of the generators, which categorizes it as a nonsmooth and nonconvex problem. The second objective of this work will be selecting a suitable algorithm or algorithms to solve the problems with different constraints. The algorithms tested are population based and are inspired by nature. A new heuristic optimization technique called Khums optimization algorithm is introduced and tested on some of the problems treated.