

# Canadian Operational Research Society Calgary Section http://www.corscalgary.org/

## PROFESSIONAL DEVELOPMENT SEMINAR

When: Noon to 1:30 PM, Thursday, May. 20th, 2010

Room 217 TransCanada Tower 450 - 1 Street SW (See attached map)

## SPEAKER

#### Ehsan Abbasi, MSc

Software Quality Engineering Research Group Department of Electrical and Computer Engineering, University of Calgary

### TOPIC

An MILP-based Formulation for Minimizing Pumping Energy Costs of Oil Pipelines: Beneficial to both the Environment and Pipeline Companies

#### Abstract

Optimal scheduling of pumps operation in fluid distribution networks (e.g., oil or water) is an important optimization problem. This is due to the fact that the dollar cost and also global carbon footprints of such a major transportation are in mega scales. For example, one of our industrial partners, a Canadian oil pipeline operator, spent more than \$18.11 million dollars in 2008 for pumping costs. According to our calculations, this would lead to up to 182,460 tons of CO<sub>2</sub> emissions annually. Therefore, even slight improvements in operation of a pipeline system can lead to considerable savings in costs and also reducing carbon footprints emitted to the environment (by introducing air pollutions needed to generate those huge amounts of electricity). In this research, a methodology for determining an optimal pump operation schedule for a fluid distribution pipeline system with multi-tariff electricity supply is developed. The optimization problem at hand is a complex task as it includes the extended period hydraulic model represented by algebraic equations as well as mixed-integer decision variables. Obtaining a strictly optimal solution involves excessive computational effort; however, a near optimal solution can be found at significantly reduced effort using heuristic simplifications. The problem is efficiently formulated in this research work based on Mixed-Integer Linear Programming. The proposed model is evaluated on a typical oil pipeline network. The numerical results indicate the effectiveness and computationally efficient performance of the proposed formulation.

**Keywords:** *pump* scheduling, *mixed-integer* linear programming, oil pipeline *networks*, *power* optimization.

#### About the Speaker:

**Ehsan Abbasi** received B.Sc. degree in Electrical Engineering from Amirkabir University of Technology in 2005 and M.Sc. degree in Energy Systems Engineering from Sharif University of Technology in 2007. Currently he is pursuing his graduate studies at the department of Electrical and Computer Engineering, University of Calgary. His research interests are power system reliability, economics and optimization. For more information on his research activities and publications visit: <u>http://people.ucalgary.ca/~eabbasi/</u>. For more information on this project visit: <u>http://people.ucalgary.ca/~vgarousi/project-sw-energy.html</u>.

There is no charge for attending the meeting. The room is available until 1:30 PM for those interested in staying afterwards to mingle and meet other OR practitioners.

# Sketch of Location for CORS Meetings at TransCanada Tower in Conference Rooms 214 and 217.

