

# Experimental and Numerical Study for Turbulent Flow Drag Reduction in District cooling systems

M. M. ABO ELAZM<sup>1</sup>   S. Z. KASSAB<sup>2</sup>   S. ELSHAFIE<sup>1</sup>

<sup>1</sup>Mechanical Engineering Dept, Arab Academy for Science and Technology, Alexandria, Egypt

<sup>2</sup>Mechanical Engineering Dept, Alexandria University, Alexandria, Egypt

E-mail: sameh\_elshafie@hotmail.com

## ABSTRACT

In the present study an experimental and numerical investigations were performed for District Cooling system in order to optimize the energy consumption as an application of the drag reduction phenomena. Simulation was carried out using finite volume method In order to maximize system efficiency by reducing pumping power due to the appearance of drag reduction phenomenon at certain concentrations of ethylene glycol in water. The drag reducing agent that was used is ethylene glycol (C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>) which is considered as an organic liquid compound to be used as anti-freeze. Several concentrations were tested and the simulation results were in fair agreement with the experimental cases studied. Results showed that with increasing ethylene glycol concentration the drag reduction increases till it reaches a maximum value of 10% at concentration of 4000 PPM and drops after that according to the drag reduction phenomena.