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## THE EFFECT OF BUOYANCY AND ROTATION ON THE FLOW AND THERMAL FIELDS AROUND A CIRCULAR CYLINDER

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### ABSTRACT

In this paper, a numerical simulation has been performed to study the fluid flow and heat transfer around a rotating circular cylinder over low Reynolds numbers. Here, the Reynolds number range 10 - 40, and the values of rotation rates ( $\alpha$ ) is varied within the range of  $0 < \alpha < 2$ . Two-dimensional and unsteady mass continuity, momentum, and energy equations have been discretized using finite volume method. SIMPLE algorithm has been applied for solving the pressure linked equations. The effect of rotation rates ( $\alpha$ ) on fluid flow and heat transfer were investigated numerically. In addition, time-averaged (lift and drag coefficients and Nusselt number) results were obtained and compared with the literature data. A good agreement was obtained for both the local and averaged values.

**Keywords:** unsteady flow, rotation rate, Richardson number, circular cylinder.