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The effects of Prandtl number on flow over a vertical heated cylinder ABDULVAHAB SAMEEN, AJITHKUMAR S, IIT Madras, chennai, India, ANILLAL S, College of engg, Trivandrum, India — Flow over a two dimensional heated cylinder is analyzed numerically using a hybrid finite element-finite volume method. We assume the flow direction to be opposite to the direction of gravity. It is fundamental in fluid dynamics that the von Karman vortex street appears in the wake of the cylinder above the Reynolds number of approximately 47. On heating the cylinder surface, the Strouhal number (St), which is the non dimensional representation of the vortex shedding frequency, increases. The gradual increase in St is followed by a sudden drop at a particular value of Richardson number (Ri), defined as the relative dominance of the buoyancy force to the inertia force reported as a sudden breakdown of the Karman vortex. Our simulations show that upon further increase in Ri, recirculation bubble reappears. The present numerical work discusses the physical reasons behind this phenomenon and the effects of Prandtl number (defined as the ratio of viscous diffusion to the moment um diffusion) on Richardson number at which break down occurs.

Abdulvahab Sameen
IIT Madras, chennai, India

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