The Effect Of Cone Angle On Heat Transfer The Self Induced Laminar Flow In A Rotating Cone

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Abstract

In this study a two dimensional axisymmetric, steady state and incompressible laminar flow in a rotating cone is investigated numerically. Fluid flows along the axis toward the sealed end and returns in an annular layer on the cone wall so-called self-induced flow. This mechanism may be used for anti-icing system on the nose bullet of an aero engine. The numerical method was carried out for five different cone angles varying from 10 to 50 degrees and also for the range of $56.8 \leq \mathrm{Re}_{\phi} \leq 84000$ which Re_{ϕ}, is the rotational Reynolds Number. The numerical method is validated against experimental data available for free disk systems, and there is a good agreement between the experimental and computed results for $\theta = 90^{\circ}$. Computational results show that Nusselt Number increases as, the rotational Reynolds number (Re_{ϕ}) and cone angles (θ) increase.

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