عنوان مقاله:

Numerical simulation of incompressible turbulent flow in shrouded disk system with radial outflow

نویسندگان:

Milad Charmchi - *Mechanical Engineering Department, Semnan University, Semnan, Iran*

Saadat Zirak - *Mechanical Engineering Department, Semnan University, Semnan, Iran*

خلاصه مقاله:

The flow behavior inside the shrouded disk system is of importance in appropriate design of turbomachinery cavities and turbine test cell hydraulics dynamometer. The turbulent incompressible flow is analyzed for the shrouded disk system with axial clearance. The flow core behaves as a Batchelor type structure when a weak inflow is imposed on the disk cavity. By increasing the inflow, the central core disappears and the tangential velocity distribution is changed to Stewartson type structure. The central core again reappears by increasing the Reynolds number. The moment coefficient of rotary disk depends on superimposed flow rate coefficient and dimensionless geometrical parameters. Moment coefficient increases with increasing inflow rate while the other parameters remain constant. The coefficient is reduced by increasing the Reynolds number. Moreover, it increases with both increasing rotary and stationary disks axial distance, and decreasing clearance ratio. The experimental results of a cavity with radial clearance are used to validate the accuracy of the simulation. The results of this analysis and its development can be used in the design of turbine test cell hydraulics dynamometers.

کلمات کلیدی:

Rotary & Stationary Disk, Batchelor & Stewartson Flow, Incompressible, Cavity Flow, Dynamometer, Moment Coefficient

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