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# Computational Modeling of Heat Transfer from a Horizontal Array Cylinders for Low Reynolds Numbers

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**Abstract :** A numerical model based on the computational fluid dynamics (CFD) approach is developed to investigate heat transfer across a longitudinal row of six circular cylinders. The momentum and energy equations are solved using the finite volume discretization technique. The convective terms are discretized using a second-order upwind methodology, whereas diffusion terms are discretized using a central differencing scheme. The second-order implicit technique is utilized to integrate time. Numerical simulations have been carried out for three different values of free stream Reynolds number (ReD) 100, 200, 300 and two different values of dimensionless longitudinal pitch ratio (SL/D) 1.5, 2.5 to demonstrate the fluid flow and heat transfer behavior. Numerical results are validated with the analytical findings reported in the literature and have been found to be in good agreement. The maximum percentage error in values of the average Nusselt number obtained from the numerical and analytical solutions is in the range of 10% for the free stream Reynolds number up to 300. It is demonstrated that the average Nusselt number for the array of cylinders increases with increasing the free stream Reynolds number and dimensionless longitudinal pitch ratio. The information generated would be useful in the design of more efficient heat exchangers or other fluid systems involving arrays of cylinders.

**Keywords :** computational fluid dynamics, array of cylinders, longitudinal pitch ratio, finite volume method, incompressible navier-stokes equations
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