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Numerical Investigation of Cavitation on Different Venturi Shapes by Computational Fluid Dynamics

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Abstract : Cavitation phenomena might rigorously impair machine parts such as pumps, propellers and impellers or devices as the pressure in the fluid declines under the liquid's saturation pressure. To evaluate the influence of cavitation, in this research two-dimensional computational fluid dynamics (CFD) venturi models with variety of inlet pressure values, throat lengths and vapor fluid contents were applied. In this research three different vapor contents (0%, 5% 10%), four inlet pressures (2, 4, 6, 8 and 10 atm) and two venturi models were employed at different throat lengths (5, 10, 15 and 20 mm) for discovering the impact of each parameter on the cavitation number. It is uncovered that there is a positive correlation between pressure inlet and vapor fluid content and cavitation number. Furthermore, it is unveiled that velocity remains almost constant at the inlet pressures of 6, 8,10atm, nevertheless increasing the length of throat results in the substantial escalation in the velocity of the throat at inlet pressures of 2 and 4 atm. Furthermore, velocity and cavitation number were negatively correlated. The results of the cavitation number varied between 0.092 and 0.495 depending upon the velocity values of the throat.

Keywords : cavitation number, computational fluid dynamics, mixture of fluid, two-phase flow, velocity of throat
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