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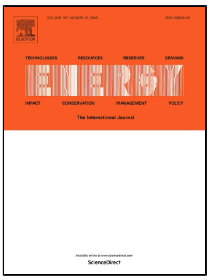

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Investigation on effects of back pressure on submerged jet flow from short cylindrical orifice filled with diesel fuel

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Abstract

The submerged jet is a common phenomenon in a fluid machinery that controls fluid flow by adjusting the back pressure with constant inlet pressure during the energy transforming process, and it has different characteristic with that by adjusting the total differential pressure. This work investigates the submerged cavitation jet flow inside a narrow cylindrical orifice under condition of varied back pressure. An optical test rig is to examine the submerged jet, and a three-dimension numerical model is to investigate the details. The results reveal that for constant inlet pressure, as the back pressure declines, cavitation jet occurs. The development process of the impingement force is divided into three periods. Period I, the impingent force monotonically increases. Period II, from the choking point to the cavitation jet starting point, the impingent force slightly decreases. Period III, the impingent force rises again. During the choking period, the input energy is unchanged, but the impact force declines. This is because the turbulence kinetic energy increases resulting in pressure energy decrease. For given pressure boundaries, the impingent force rises as the standoff distance of the target plate increases, and the standoff has fewer influences on the impingent force when the target plate is farther.

***Keywords**:* Submerged jet; Back pressure; Cavitation; Impingement force; Diesel fuel.

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