Numerical analysis on the hydrodynamic characteristics of PWJ according to the nozzle taper angle and orifice size

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ABSTRACT

The jet velocity and internal pressure are difficult to measure directly through the experimental tests. Therefore, in this study, we have measured the jet velocity and internal pressure indirectly through the numerical simulation using ANSYS Fluent software. This study aimed to understand how the velocity of jet and internal pressure are affected by the taper angle of the nozzle and the orifice size using CFD analysis. The jet velocity and internal pressure were observed by applying four cases of taper angles (i.e. 0°, 30°, 45°, and 60°) and three cases of orifice sizes (i.e. 0.15 mm, 0.254 mm, and 0.33 mm) under the same water inlet pressure of 320 MPa. We have found that the nozzle geometry and orifice size influenced the hydrodynamic results of the plain waterjet.

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