

Fundamental investigation about perforation of steel tubing by gas-coated abrasive waterjets.

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Abstract

A method which is supplied by jetting gas for improving for the performance of abrasive waterjets is suggested, and a gas-coated abrasive waterjets system was developed at our laboratory last year. However, the system had a problem that the impinging time of nitrogen gas was not efficient because the gas supplying system was small. In this study, I aim to develop a new gas supplying system that can supply enough gas and evaluate the perforation performance of a gas-coated abrasive waterjets system with the new gas supplying system. Main results obtained in this study are summarized as follows: The experimental system which supplies enough gas to the nozzle system under high ambient pressure by aspirator action of waterjets has been developed. A instantaneous photographs of gas-coated abrasive waterjets under high ambient pressure were taken, and the behavior of abrasives and gas in the mixing chamber was clarified. Perforation experiments using gas-coated abrasive waterjets system were performed for a steel tubing with the new gas supplying system, and the performance was evaluated. The results showed that the perforation performance was not improved. The reason for the unimproved performance was consider to lie in the direction of gas-jet and position of gas supply. Thus, modification of the gas-coated abrasive waterjets system was proposed to improve the perforation performance.