

Prediction for the Pressure Drop of Gas-Liquid Cylindrical Cyclone in Sub-Sea Production System

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Abstract : With the rapid development of subsea oil and gas exploitation, the demand for the related underwater process equipment is increasing fast. In order to reduce the energy consuming, people tend to separate the gas and oil phase directly on the seabed. Accordingly, an advanced separator is needed. In this paper, the pressure drop of a new type of separator named Gas Liquid Cylindrical Cyclone (GLCC) which is used in the subsea system is investigated by both experiments and numerical simulation. In the experiments, the single phase flow and gas-liquid two phase flow in GLCC were tested. For the simulation, the performance of GLCC under both laboratory and industrial conditions was calculated. The Eulerian model was implemented to describe the mixture flow field in the GLCC under experimental conditions and industrial oil-natural gas conditions. Furthermore, a relationship among Euler number (Eu), Reynolds number (Re), and Froude number (Fr) is generated according to similarity analysis and simulation data, which can present the GLCC separation performance of pressure drop. These results can give reference to the design and application of GLCC in deep sea.

Keywords : dimensionless analysis, gas-liquid cylindrical cyclone, numerical simulation, pressure drop

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