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Thermodynamic effects on Venturi cavitation characteristics[1]
ZHIGANG ZUO, HAOCHEN ZHANG, Tsinghua Univ., KNUD AAGE MRCH, Technical Univ. of Denmark, SHUHONG LIU, Tsinghua Univ. — In studies using cold water as the working liquid, the thermodynamic effect of cavitation is usually ignored. However, in cryogenic liquids, refrigerants and high temperature water the thermodynamic effect is significant, and it suppresses the development of cavitation by reducing the temperature at the boundary of expanding cavitation bubbles. In this paper the thermodynamic effect is systematically studied by Venturi cavitation in a blow-down type tunnel for the first time, using water at temperatures up to relatively high levels, and at controlled dissolved gas content in the supply reservoir (measured by dissolved oxygen, DO). The cavitation characteristics are analyzed from the experiments, and the mean cavitation length is chosen as the quantity suited to reveal the thermodynamic effect. With an increase of the thermodynamic parameter, a decrease of cavitation length is observed, which is consistent with suppression of cavitation by the thermodynamic effect. Within the range of DO content tested, the DO content has little influence on the mean cavitation length and the unsteady cavitation characteristics, which is in contrast to the effect of gas content on cavitation nuclei generally.

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