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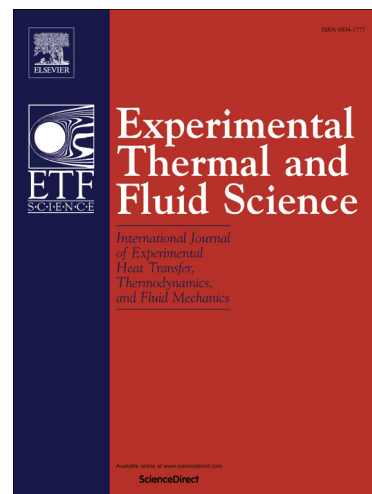
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Influence of opening and closing process of ball valve on external performance and internal flow characteristics

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Abstract: Ball valve as pipe flow control component is widely used in the process industry to control flow rate and flow direction or cut off the flow of pipeline system. The opening-closing dynamic characteristics of the valve have a direct influence on the operation reliability. In this paper, we report on experiments and numerical simulations which were implemented to investigate the influence of opening and closing process on the external transient performance and the internal flow characteristics of ball valve under different opening and closing time. In the process of opening and closing experiment, flow rate, inlet pressure and outlet pressure of test valve are measured. The inlet velocity and outlet pressure with time obtained from experiment are used as the inlet and outlet boundary conditions. On the basis of UDF and moving mesh technology, the unsteady numerical simulation was performed during the opening and closing process. Results show that external transient performance and flow field of ball valve have obvious difference between opening and closing process as the fluid lags behind the change of relative opening. With the opening or closing time increase, the differences gradually become small and they are gradually close to that of steady condition.

Key words: *Opening process; closing process; Ball valve; Transient experiment; Unsteady numerical simulation*

1. Introduction

Ball valve as pipe flow control component is widely used in the process industry to control flow rate and flow direction or cut off the flow of pipeline system. The flow in valve in the process of opening and closing is pressure-drive variable-section

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