NUMERICAL ANALYSYS ON THE PREDICTION OF CLOSING TIME OF THE LIFT CHECK VALVE USING CIP METHOD

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ABSTRACT

The present study has been carried out for the prediction of closing time on the lift check valve. The check valve mounted on the flow line is used for the purpose of protecting the centrifugal pump and the related facility, making the flow path, and maintaining the pressure boundary during the operation mode change in steam power plant and nuclear power plant. Especially, the check valve mounted on safety feed system and nuclear safety system is operated to open state and has a role of acquiring enough fluid such as safety feed and auxiliary feed in the Design Basis Accident. And the check valve is operated with enough sealing and with protecting steam hammer in normal operational mode. For this purpose, the check valve can be open easily and be maintained in the open state in case of small flow velocity. In this research, the CIP(Cubic Interpolated Propagation) method is used to analyze the fluid structure interaction problem between fluid flow and check valve. For the fluid flow analysis, the non-staggered, non-orthogonal, and unstructured grid system are considered. And also the standard k-ε turbulence model is used. The lid-driven cavity flow and wave propagation flow are considered in order to validate the basic performance of the CIP solver. Test results show a good agreement with the verified results The dynamic behavior of the moving check valve has been calculated from the dynamic analysis solver. The interfacing process between the CIP solver and the dynamic solver has been performed. In order to validate the test results, the closure time was compared between the experiment result and the numerical result. The predicted results from the numerical analysis have shown the reasonable results comparing the experimental data.

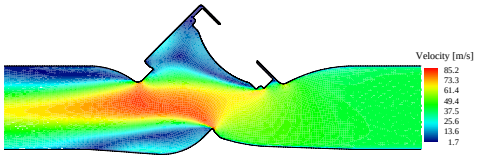

Fig. 1.Velocity contour within the valve operating at supply velocity 10m/sec

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