

## **Prediction of Critical Flow Rate in Tubular Heat Exchangers for the Onset of Damaging Flow-Induced Vibrations**

**Authors :** Y. Khulief, S. Bashmal, S. Said, D. Al-Otaibi, K. Mansour

**Abstract :** The prediction of flow rates at which the vibration-induced instability takes place in tubular heat exchangers due to cross-flow is of major importance to the performance and service life of such equipment. In this paper, the semi-analytical model for square tube arrays was extended and utilized to study the triangular tube patterns. A laboratory test rig with instrumented test section is used to measure the fluidelastic coefficients to be used for tuning the mathematical model. The test section can be made of any bundle pattern. In this study, two test sections were constructed for both the normal triangular and the rotated triangular tube arrays. The developed scheme is utilized in predicting the onset of flow-induced instability in the two triangular tube arrays. The results are compared to those obtained for two other bundle configurations. The results of the four different tube patterns are viewed in the light of TEMA predictions. The comparison demonstrated that TEMA guidelines are more conservative in all configurations considered

**Keywords :** fluid-structure interaction, cross-flow, heat exchangers,

**Conference Title :** ICMASE 2014 : International Conference on Mechanical, Aerospace and Systems Engineering

**Conference Location :** London, United Kingdom

**Conference Dates :** January 20-21, 2014