Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Numerical investigation of the convective heat transfer coefficient with longitudinal pitch variation in a staggered tube bank ASHRAF ALFANDI, Jordan Atomic Energy Commission, JUHYEON YOON, Korea Atomic Energy Research Institute, KHALIFEH ABUSALEEM, University of Jordan, MOHAMMAD ALBATI, SALIH KHAFAJI, Jordan Atomic Energy Commission — In this study, the effect on a shell-side heat transfer coefficient is investigated using the CFD code FLUENT with a variation in longitudinal pitch to diameter ratio, SL, in the range of 1.15 to 2.6 with a fixed transverse pitch to diameter ratio. For the benchmark purposes with the available empirical correlation, typical thermal-hydraulic conditions for the Zukauskas correlation are assumed. Many sensitivity calculations for different mesh sizes and turbulent models are performed to check the accuracy of the numerical solution. A realizable κ-ε turbulence model was found to be in good agreement with results of the Zukauskas correlation among the other turbulence models, at least for the staggered tube bank. It was found that the average heat transfer coefficient of a crossflow over a staggered tube bank calculated using FLUENT is in good agreement with the Zukauskas correlation-calculated heat transfer coefficient in the range of 1.15 – 2.6. For a staggered tube bank, using the Zukauskas correlation seems to be valid down to SL = 1.15.

Ashraf Alfandi
Jordan Atomic Energy Commission

Date submitted: 05 Jul 2015 Electronic form version 1.4