Contribution ID: **937** Type: **Poster Presentation**

C1Po2D-05 [07]: Comparative study on performance of regenerator under different fillers

Monday 22 July 2019 14:00 (2 hours)

Abstract:The regenerator is the core heat exchange component of the Stirling engine, and the structural form and physical properties of the filling material are the vital important factor determining its performance. In this paper, a three-dimensional model of the regenerator is established using Ansys' fluent module to simulate the regenerative flow in the alternating flow. The property of four kinds of common fillers, namely stainless steel wire mesh, foam metal, powder sintered material and random fiber felt, are mainly explored. Through the numerical simulation of the fillers with different porosity, the heat transfer and resistance characteristics and pressure drop loss of the filler were calculated by the local non-thermal equilibrium model. Finally, the parameter Nu/Cf^(1/3) is used as an indicator to measure the performance of the filler. Comparing the comprehensive performance of these fillers yields optimal results that will guide the use of future regenerator fillers.
Key words: regenerator; Fluent; filler; numerical simulation; comprehensive performance

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Session Classification: C1Po2D - Heat Exchangers