Multiphysics Simulation of a Printed Circuit Heat Exchanger

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Abstract

Compact Heat Exchangers, specifically Printed Circuit Heat Exchangers, are widely used in industry as a replacement for traditionally large heat exchangers (e.g. Shell and Tube) due to their small size and high effectiveness. Modelling of PCHEs, specifically those manufactured by Heatric has proven to be difficult due to the limited internal design information provided by the manufacturer. The current work is focused on developing a computational model of a Heatric PCHE using COMSOL Multiphysics software for direct comparison, which is seen in Figure 1, to the results of an ANSYS model of an identical PCHE found in the literature.

The present results show a percentage difference between the two models for the outlet temperatures of approximately 1.6% and 2.4% for the hot and cold channels respectively. The corresponding pressure drop is approximately 0.15% which is comparable to the 0.13% pressure drop found in the previous study.
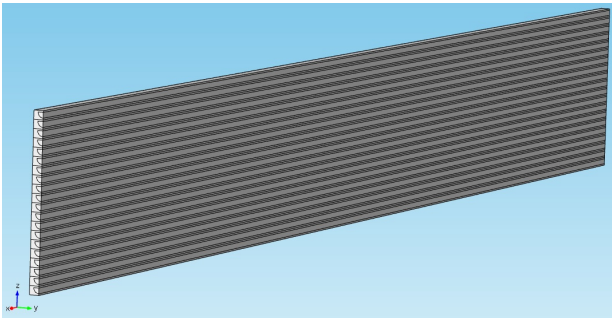
Figures used in the abstract

Figure 1: Model of PCHE.