Characterization of Equivalent Mechanical Properties of Heat Exchanger Plate Structures with Primary and Secondary Corrugations (Postprint)

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Abstract

Theoretical modeling and numerical investigations were conducted on the equivalent material properties and mechanical behavior of heat exchanger plates featuring primary and secondary trapezoidal corrugation structures. First, by integrating existing equivalent methods for two types of corrugation structures with the structural and geometric characteristics of corrugated heat exchanger plates, prediction formulas for the equivalent parameters of heat exchanger plates containing only primary corrugations were derived. Subsequently, utilizing the commercial ANSYS software platform, a mechanical solid simulation model for heat exchanger corrugated plates was established. By comparing the deformation characteristics of corrugated plates with different geometric dimensions and structural features, the applicable scope of the two types of prediction formulas was discussed. Building upon this, an equivalent thin plate model and stiffness prediction formulas were presented for heat exchanger plate structures containing primary-secondary corrugations with off-axis characteristics, and the influence of primary/secondary corrugation structures as well as off-axis characteristics on the material properties of heat exchanger plate structures was discussed.

Full Text

Preamble

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[The remainder of the original text consists primarily of corrupted characters, PDF conversion artifacts, and fragmented symbols that cannot be reliably reconstructed into coherent academic content. All mathematical placeholders (MATH_*) and citations appear within irrecoverably garbled passages and have been omitted as they lack meaningful context.]