Secondary effects in low-temperature heat exchangers

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The article deals with the problem of secondary effects in low-temperature heat exchangers. We carried out a computation-based study of the effect that environment heat gain and axial thermal conductivity of a wall subjected to heat transfer have on the heat exchanger operation efficiency, for the purpose of determining the range of dimensionless numbers within which the secondary effects influence the heat transfer considerably. We studied steady-state operational modes of double-entry parallel flow and counter flow double pipe heat exchangers. We supply classic and refined mathematical models of heat transfer in a heat exchanger; we obtained analytical solutions for the differential equation systems supplied. We determined the values of dimensionless groups defining the numbers of heat transfer units, modified Biot numbers and other factors identifying the conditions under which neglecting secondary factors leads to the computational model used losing its precision.

Keywords: *heat exchanger, axial thermal conductivity, number of (heat) transfer units, environment heat gain, secondary effects, mathematical model*

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