

Determination of Criteria for Achieving the Same Outlet Temperatures of Both Fluid Streams in Counterflow Heat Exchangers

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Abstract

The paper presents an explicit method of determining the values of NTU and consequently determining the heat transfer area A_0 , in order to obtain equal outlet temperatures of both fluid streams in counterflow heat exchangers. Such a condition has to be achieved in some technical applications of counterflow recuperators. The paper shows that NTU is determined by the capacity rate ratio and that the effectiveness of these recuperators depends only on the capacity rate ratio. Expressions for the general case of a counterflow heat exchanger were derived, from which expressions for two special cases were obtained. One of those is a case when a stronger stream changes its aggregate state and another one is a case of the so-called balanced recuperator. For these cases explicit expressions for effectiveness were also derived. The calculation results are presented by diagrams and additional description.