Proceedings of CHT-15
ICHMT International Symposium on Advances in Computational Heat Transfer

May 25-29, 2015, Rutgers University, Piscataway, USA

CHT-15-280

CHT FOR HEAT-EXCHANGER DESIGN; PAST, PRESENT AND FUTURE

Brian Spalding
Professor Emeritus, Imperial College, London
and CHAM, Ltd., UK

ABSTRACT The first demonstration that computational heat transfer could assist the designers of heat exchangers was made by Suhas Patankar and myself in 1974. By the end of the decade, CHT had proved its practical value by helping to analyse and cure the flow-related problems that ailed the steam generators of water-cooled nuclear-power reactors. CHT was soon also being applied to steam condensers, so as to predict the steeply-varying distributions of vapour-phase composition within their shells.

For the design of more conventional heat exchangers, however, CHT is even now rarely used. Computer-software packages **are** employed; but they embody pre-CHT design methods. The world-wide cost, in terms of excessive investment and running expenses, and of global warming, would surely be regarded as unacceptable if it were ever calculated and publicised.

Academic-research applications of CHT to heat-exchanger analysis, on the other hand, have been numerous and successful. Bengt Sunden and his colleagues have been especially prolific in this activity. So there is no doubt that CHT can provide the quantitative performance prediction and qualitative insight that will enable designers to create economy- and environment-friendlier equipment.

The paper discusses two ways in which CHT-specialists can contribute to this beneficial-to-society end:

1. By providing easy-to-use-by-designers software packages which activate a customised 'CHT engine'.

2. By enabling this 'engine' to use the two kinds of CHT, namely space-averaged and detailed-geometry, in appropriate combination.

In respect of (1), some examples will be presented.

In respect of (2), some numerical-analysis questions will be raised and tentatively answered.