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THE EFFECTS OF INLETS CONDITIONS ON HEAT TRANSFER IN ANNULAR SWIRLING DECAYING FLOW

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Abstract. *The purpose of this paper is to draw attention to the potential usefulness of confined swirling decaying flows in heat transfer enhancement first put forward by Talbot. Local Nusselt numbers were experimentally measured in an annular pipe for a constant heat flux boundary condition. Decaying swirling motion of air was produced by means of tangential inlet slots through which the air was introduced. The number of slots and the angle of tangency were varied while the resultant flow field inside the annulus was kept below 2000 Reynolds. A slightly modified version of the Dittus-Boelter correlation was used in order to quantify the heat transfer enhancement over a range of experimental flow conditions (Re from 1100 to 2000). On the matter of heat transfer enhancement, swirling flow showed real promise, augmentation upto 24% could be achieved, while on the matter of power consumption, swirling flow was considerably more demanding than the nonswirling laminar flow.*