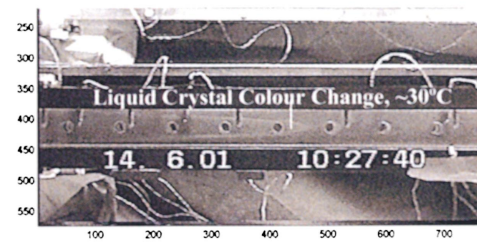
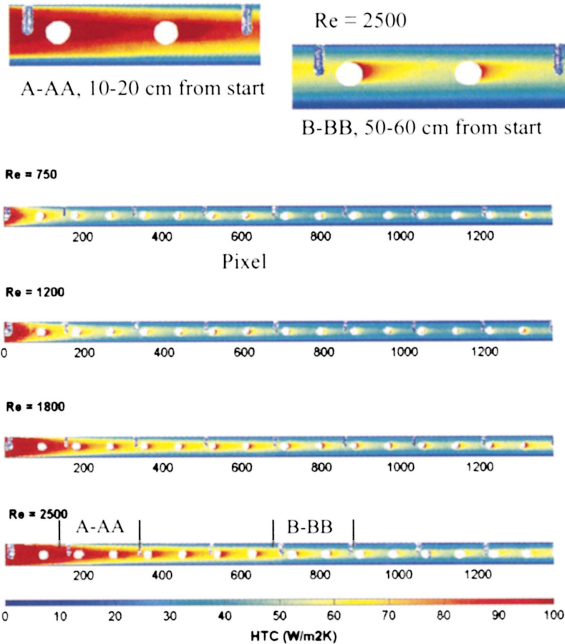


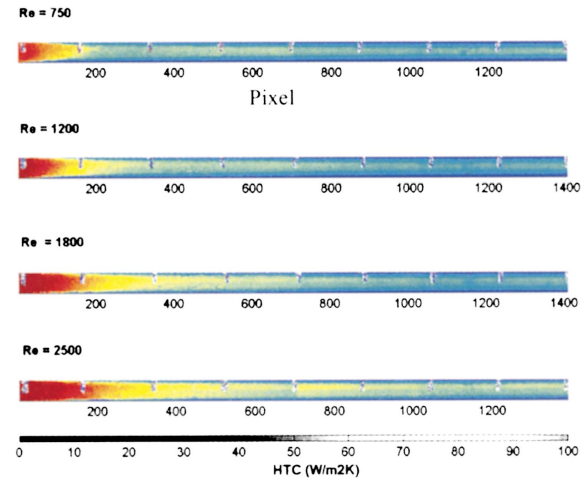
Raw Data – Single Frame, CCD



Perforated Fin Results



Plain Fin Results



Photographs on the Effect of Perforations on the Heat Transfer due to Laminar Flow over an Extended Surface

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ABSTRACT

In the past it has not been resolved as to whether perforated surfaces on a fin enhance heat transfer. In this photographic study which utilizes liquid crystal thermography, the evidence suggests that there is an **increase** in the local heat transfer coefficient in the vicinity of the downstream side of the perforations. The perforations appear to **partially disrupt** the thermal boundary layer and they appear to allow a **partial restart** of the boundary layer on the backside of the hole. For these series of photographs, a transient heating technique is employed. Helium at approximately 70°C is allowed to flow through 5 perspex channels separated by 1 mm thick perforated fins. The channel cross sectional areas are 33 mm high by 13.1 mm wide. The channel length is 1 m. The initial temperature of the channels was 24°C. A one degree, narrow band, liquid crystal (30°C colour change temperature) was painted over the black painted centre channel fin. The time history of the colour change of the painted fin was recorded on a standard CCD video camera. The peak intensity-time relationships were obtained from image processing the recorded video and the heat transfer coefficients were evaluated using a transient thin fin heat transfer model. The helium temperature was measured at 5 locations along the channel. As can be seen, there appears to be a **local heat transfer enhancement** near the backside of the perforations. Comparisons are made to non-perforated fins in the channel Reynolds number range of 750-2500.