

FILM COOLING PERFORMANCE USING TRANSIENT LIQUID CRYSTALS MEASUREMENTS

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ABSTRACT

This paper is an experimental investigation of the film cooling performance over a flat plate using transient liquid crystal measurements. Cylindrical hole with straight angle injection was used. Experiments were conducted at different blowing ratio ($M=0.5$ to 1.5) and different cooling channel Reynolds number ($Re_{Dh,c}=10000$, to $Re_{Dh,c}=40000$). All Experiments were conducted at constant hot gas Reynolds number and constant pressure ratio and. Film cooling Performance h (heat transfer coefficient) and η (adiabatic film cooling effectiveness are determined using the transient liquid crystal method combined with a numerical regression method to solve for the two unknowns). The results are discussed and compared to previously published literature.

KEYWORDS: Adiabatic, Film Cooling, Heat Transfer, Transient, Liquid Crystal