



Heat Transfer in a Cooling Channel with Vortex Generators

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The artwork shown consists of instantaneous photos of thermochromic liquid crystal (TLC) images on the surfaces of a model of an advanced airfoil internal cooling passage. Heat transfer enhancement over the entire passage results from the placement of delta-wing shaped vortex generators on one of the passage walls (Chyu et al., 1997). Sequential TLC images are transformed into distributions of heat transfer coefficients using a custom-developed, liquid crystal thermographic processing system. The average heat transfer coefficient over the entire periodic region can be as high as 5 times that in a smooth passage. Such a high level heat transfer enhancement has never been reported for internal passage cooling. The artwork indicates the swirling in the main passage flow; most evident on the sidewall photo.