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Numerical Analysis of Film Cooling at High Blowing Ratio

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BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 40 pages. Dimensions: 9.7in. x 7.4in. x 0.1in. Computational Fluid Dynamics is used in the analysis of a film cooling jet in crossflow. Predictions of film effectiveness are compared with experimental results for a circular jet at blowing ratios ranging from 0.5 to 2.0. Film effectiveness is a surface quantity which alone is insufficient in understanding the source and finding a remedy for shortcomings of the numerical model. Therefore, in addition, comparisons are made to flow field measurements of temperature along the jet centerline. These comparisons show that the CFD model is accurately predicting the extent and trajectory of the film cooling jet; however, there is a lack of agreement in the near-wall region downstream of the film hole. The effects of main stream turbulence conditions, boundary layer thickness, turbulence modeling, and numerical artificial dissipation are evaluated and found to have an insufficient impact in the wake region of separated films (i. e. cannot account for the discrepancy between measured and predicted centerline fluid temperatures). Analyses of low and moderate blowing ratio cases are carried out and results are in good agreement with data. This item ships...



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