CFD Validation for the Prediction of Heat Transfer in Internal Cooling Passages Optimized for Rapid Turnout

Quick and accurate predictions for heat transfer in internal cooling channel geometries can increase throughput when designing new geometries or down selecting first test cases. Typically, the ability to predict within 20% of experiments has been deemed acceptable but often requires very fine meshes and longer run times, especially for more complicated geometries.

A case study of a classic open literature experimental study is used within to describe the sequence of steps and lessons learned in order to achieve quick and accurate predictions of local Nusselt number. Impact of boundary definitions, post processing technique and turbulence model are addressed. These contributors are quantified and the final prediction lies within experimental uncertainty for the range of Reynolds numbers available.

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[1] http://www.cd-adapco.com/conference/star-global-conference-2013