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Aerodynamic Validation Studies for Space & Defense Applications

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Before a CFD code is applied in a design or diagnostic environment, an adequate level of testing and validation should first be completed to develop confidence in the level of performance and accuracy of the code. In addition, the accuracy, reliability and utility of a code must be determined for the specific type of application of interest in order to establish credibility and confidence in its resultant data.

A verification/validation study of the STAR-CCM+ code was undertaken as part of CRM solutions' code evaluation effort. The purpose of this study was to establish the proper function, the range of application, the relative accuracy, the efficiency and the overall performance of STAR-CCM+ in prediction of flow phenomena of interest to current and potential CRM customers. Cases were selected based on this relevance, the availability of ?good? quality, well documented wind tunnel data and their appropriateness for validation purposes.

The results of these studies were compared to available wind tunnel data or computational data generated using well validated Navier-Stokes codes. For each computational study the influence of numerical algorithms, altitude and turbulence modeling on the prediction of aerodynamic coefficients was examined. In addition, geometry import, repair, wrapping and grid generation capabilities of STAR-CCM+ were examined for complex geometries of interest to help determine the required level of user expertise necessary to succeed in a production environment.

The primary questions were: Does STAR-CCM+ attack a broader range of problems than available with current in-house software and will such analyses enhance the range and accuracy of CFD data produced at CRM for current and potential customers?

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