Numerical Investigation of Turbulent Flows by SST Model with An Algebraic Distance

***†H.W. Zheng[1]**

[1] LHD, Institute of Mechanics, Chinese Academy of Science, No.15 Beisihuanxi Road, Beijing 100190, China

*Presenting author: h.zheng@imech.ac.cn
†Corresponding author: h.zheng@imech.ac.cn

Introduction

Computational fluid dynamics has become an important tool. For example, the prediction of lift and drag play an important role in the engineering design. To predict these aerodynamic forces, the turbulent model plays a key factor. However, most of the popular turbulent model (for example, the S-A and SST model) needs to calculate the distance to the nearest wall. This will be time consuming in problems with complex geometry or moving boundary. Besides, the distance depended turbulent model is not Galilean invariant. Hence, in this article, a SST model with an algebraic distance is presented. Instead of calculating the explicit distance, an algebraic distance is employed. The basic idea is to calculate the turbulent length scale and transfer it to be an equilibrium distance to the wall. Since there are no explicit distance in the formula, the model is Galilean invariant. To verify this new distance, some benchmark turbulent problems are studied by our in-house cell centered hybrid mesh based Navier-Stokes code (PolySim). The results show that this SST model with an algebraic distance can produce good numerical results which agree well with the corresponding experiment data.

Acknowledgement

This research work was supported by the Natural Science Foundation General Program under Grant 11572336.