

# 10<sup>th</sup> OpenFOAM Conference

## Implementation of the SABCМ transition model in OpenFOAM

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The local correlation transition model (LCTM) of Cakmakcioglu and Bas<sup>i</sup> (the SABCМ model) has been implemented and validated in OpenFOAM. The implementation has also been tested in parallel. The new transition model has been extensively validated against two ERCOFTAC flat plate cases (T3A and T3B) as well as a 2D airfoil (DU\_00\_W\_212) at  $Re=3e6$  and  $Re=9e6$ . The results obtained are in good agreement with XFOIL predictions and experimental results and compare favourably to other multi-equation transition models such as Langtry-Menter's kOSSTLM model<sup>ii</sup> and Medida's gamma transition model<sup>iii</sup>. In the drag bucket of the DU\_00\_W\_212 airfoil, the SABCМ produce values close to that of the gamma transition model, both results being slightly worse than the kOSSTLM model. Lift values, however, are overpredicted by the SABCМ model in the post-stall range.

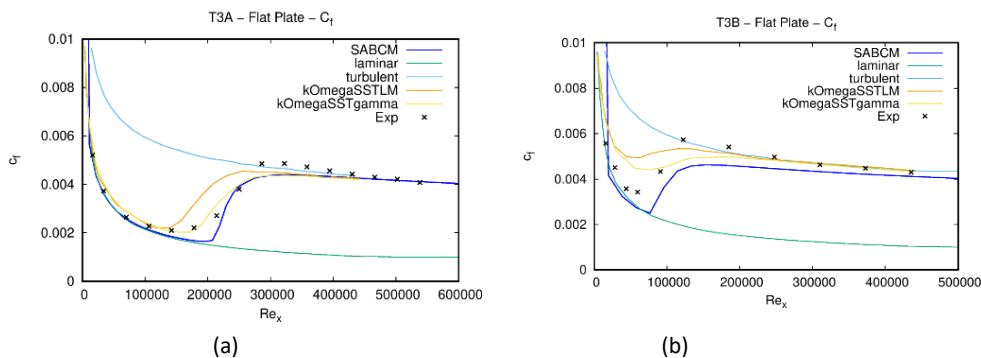


Figure 1: Distribution of skin friction coefficient for (a) the T3A flat plate and (b) the T3B flat plate. Comparison against wind tunnel data, Langtry-Menter and gamma transition models.

- i. Cakmakcioglu et al., Proc. Inst. Mech. Eng. Part C J. Mech. Eng. Sci., vol. 232, no. 21, pp. 3915, 2018
- ii. R. B. Langtry and F. R. Menter, "Correlation-Based Transition Modeling for Unstructured Parallelized Computational Fluid Dynamics Codes," AIAA J., vol. 47, no. 12, pp. 2894–2906, Dec. 2009, doi: 10.2514/1.42362
- iii. S. Medida, "Correlation-based Transition Modeling for External Aerodynamic Flows", Doctor of Philosophy, 2014 Dr. James D. Baeder Department of Aerospace Engineering, University of Maryland, Available online: <http://hdl.handle.net/1903/15150>