

Homework

Turbulence and CFD models: Theory and applications Lecture 6

Single task

This homework consists of bibliographical research. You are asked to look into the literature and document a RANS turbulence model. You should describe the solvable equations, closure coefficients, auxiliary relations (damping functions, blending functions, and so on), recommended boundary conditions and initial conditions, limitations, deficiencies, palliatives, and best standard practices. You must include all the references used, and briefly describe at least one validation case found in the literature that applies to the chosen model.

The following turbulence models are not accepted:

- Standard $k - \epsilon$ [1].
- Wilcox 1988 $k - \omega$ [2].
- Standard Spalart-Allmaras [3].

References

- [1] B. E. Launder, D. B. Spalding. The Numerical Computation of Turbulent Flows. Computer Methods in Applied Mechanics and Engineering, Vol. 3, Issue 2, pp. 269-289, 1974.
- [2] D. C. Wilcox. Reassessment of the Scale-Determining Equation for Advanced Turbulence Models. AIAA Journal, Vol. 26, No. 11, pp. 1299-1310, 1998.
- [3] P. Spalart, S. Allmaras. A One-Equation Turbulence Model for Aerodynamic Flows. Recherche Aerospatiale, No. 1, pp. 5-21, 1994.

General guidelines

- Be technical and concise when written your overview of the turbulence model.
- You can use vector notation or index notation.
- You can also write the equations in their expanded Cartesian form.
- When writing down the equations, identify the production, dissipation and diffusion terms.
- Do not forget to add the references. You should use at least two references (websites and Fluent documentation are allow).
- It will be highly appreciated if you write your homework using \LaTeX (this is not compulsory). You can use overleaf, which is a free online \LaTeX editor.
 - <https://www.overleaf.com/>
- You can get a quick start on using \LaTeX at this link:
 - https://www.overleaf.com/learn/latex/Learn_LaTeX_in_30_minute
- Use any of the bibliography styles described at the following link,
 - https://www.overleaf.com/learn/latex/biblatex_bibliography_styles
- You can write your report in English or Italian.
- Do not hesitate to contact me if you have any questions.

Deadline

The deadline to submit your homework is 20 May 2020. You can send it to my email: joel.guerrero@unige.it