Assignment 2
46115 Turbulence Modeling
Deadline: 31 October 2022

September 27, 2022

Turbulent channel flow modeling

For inspiration and possible modification, you will be given a finite difference solution to 1D laminar fully developed turbulent channel flow using the mixing length approach. Run the channel flow at Reτ= 180, 590, and 2000 and compare velocity profiles and Reynolds stress against available data e.g., Kim et al. (1987).

1 – Implement a two-equation k-epsilon and solve for the above channel flow. Show the impact of having an appropriate damping function and compare against mixing length model results.

2 – Implement a k-omega SST model, plot the velocity profiles and Reynolds stress component(s) and compare against available literature, e.g., Kim et al. (1987) and the online database located here.

References

Feel free to use the following references or find your own:

[1] Kim, J., Moin, P. and Moser, R., 1987. Turbulence statistics in fully developed channel flow at low Reynolds number. Journal of fluid mechanics, 177, pp.133-166.

[2] Moser RD., DNS Data for Turbulent Channel Flow, https://turbulence.oden.utexas.edu/$MKM_1999.html$