

Design and Rationale of High Resolution Schemes in OpenFOAM

Instructor: Holger Marschall

Training type: Intermediate

Session type: Lecture with examples

Software stack:

- foam-extend 4.0

Full description

This training is devoted to bounded (non-linear) high-order scalar advection schemes within the cell-centred, pseudo-staggered Finite Volume framework of FOAM. We will review the most frequently used non-linear approaches, i.e. flux/slope limiters and normalised variable formulations, and their theoretical basis leading to well-established boundedness criteria, i.e. total variation diminishing (TVD) and convection-boundedness criterion (CBC).

This and a close inspection of the implementation in FOAM shall reveal the schemes' performance with respect to stability, accuracy and boundedness. We shall deduct design principles and establish general aspects for appropriate scheme selection as well as highlight possible improvements when it comes to the advection of sharp fields, e.g. by local virtual upwind limiting. The training is complemented by hands-on examples.