Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Subgrid-scale models for large-eddy simulation of rotating turbulent flows[1] MAURITS SILVIS, University of Groningen, XAVIER TRIAS, Technical University of Catalonia,Spain, MAHDI ABKAR, HYUNJI JANE BAE, ADRIAN LOZANO-DURAN, Stanford University, ROEL VERSTAPPEN, University of Groningen — This paper discusses subgrid models for large-eddy simulation of anisotropic flows using anisotropic grids. In particular, we are looking into ways to model not only the subgrid dissipation, but also transport processes, since these are expected to play an important role in rotating turbulent flows. We therefore consider subgrid-scale models of the form $\tau = -2\nu_t S + \mu_t(S\Omega - \Omega S)$, where the eddy-viscosity ν_t is given by the minimum-dissipation model, μ_t represents a transport coefficient; S is the symmetric part of the velocity gradient and Ω the skew-symmetric part. To incorporate the effect of mesh anisotropy the filter length is taken in such a way that it minimizes the difference between the turbulent stress in physical and computational space, where the physical space is covered by an anisotropic mesh and the computational space is isotropic. The resulting model is successfully tested for rotating homogeneous isotropic turbulence and rotating plane-channel flows.

[1]The research was largely carried out during the CTR SP 2016. M.S, and R.V. acknowledge the financial support to attend this Summer Program

Roel Verstappen
University of Groningen

Date submitted: 28 Jul 2016 Electronic form version 1.4