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Numerical Model of 3D Vorticity

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We study a turbulent model based on vorticity associated to turbulent transport of fluids. The basis of this study is the use of a lengthscale that controls the transport of turbulent vorticity, and we transform the different sets of Reynolds (RANS) equations.
Once we obtain the system of equations, a numerical integration has been implemented. Simultaneously, we have performed the quantification of the evolution of several vortexes placed in centred zones of the proposed grid.
The system of equations has been discretized using a 3D cartesian grid of 60x60x120. Then, we have applied an integration technique of finite increments.
Throughout the use of Reynolds' decomposition, in mean and perturbed velocity components, it is necessary to calculate every magnitude in both versions at the same time, mean and perturbed. Because of this, during the first temporal interval. The related average terms have to be calculated trough spatial averaging. At the second phase, some of those spatial calculations are going to be substituted by the showed system of equations. Finally, at the third integration interval (last phase), we propose the use of a combination of spatial and temporal averages together with this system of equation in order to evaluate the instantaneous terms.
Different vortical structures have been placed in the centred zones of thhe grid array. The results showed some main aspects of the eddies for instance, the elongation along their own motion.