Abstract:

The thesis deals with the construction of an adaptive 1D and 2D mesh in the framework of the cell-centered finite volume scheme. The adaptive strategy is applied to the numerical solution of problems governed by the Euler equations, which is a hyperbolic system of PDE's. The used algorithm is applicable to non-stationary problems and consists of three independent parts, which are cyclically repeated. These steps are PDE evolution, mesh adaptation and interpolation of numerical solution from the old mesh to the newly adapted mesh. Owing to this the algorithm can be used also for other hyperbolic systems. The thesis is focused on the development of our mesh adaptation strategy, based on the anisotropic mesh adaptation, which preserves the geometric mass conservation law in each computational step. Several test problems with moving discontinuity are computed to compare our algorithm with Moving Mesh algorithms.

Keywords: finite volume method, adaptive methods, geometric mass conservation law