

Abstract: In the thesis we study incompressible turbulent flow using spectral element method (SEM). We present fundamentals of SEM which can be seen as a combination of spectral method and finite element method. Turbulent flow is described with the help of two-equation k - ω turbulence models. We give reasons for the choice of Kolmogorov's and Wilcox model and implement them in 2D into an existing SEM C++ framework, Nektar++. Analytical solutions of Navier-Stokes equation were found and used as test cases for the implementation of the models. We simulated turbulent flow in channel and compared the results with direct numerical simulation.