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# Convergence analysis of the Navier-Stokes- $\alpha$ equations on bounded domains

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## Abstract

The Navier-Stokes- $\alpha$  equations were developed as a LES (Large Eddy Simulation) model for governing turbulent fluid flows using physical principles such as Lagrangian averaging and asymptotic expansions in Hamilton's principle to the turbulence in the flow being statistically homogeneous and isotropic. These equations can also be seen as a regularization *à la Leray* of the Navier-Stokes equations associated with the parameter  $\alpha$  being the smaller scale being capture for the model.

In this talk we will present some convergence results between the approximate solutions being computed by using eigenfunctions of the Stokes operator of the two-dimensional Navier-Stokes- $\alpha$  equations and a solution of the two-dimensional Navier-Stokes equations with respect to the parameter  $\alpha$  and the eigenvalues. In particular, we show two different convergence results (a) local-in-time error estimates and (b) global-in-time error estimates. The latter will establish by using the concept of stability for solutions of the Navier-Stokes equations in terms of the  $L^2$  norm.

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