MICROPOLAR NANOFLUIDS USING B-SPLINE DIVERGENCE CONFORMING SPACES

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Micropolar fluids are a subclass of simple microfluids presented by Eringen [1, 2], that have gained attention from researchers because they are expected to successfully model the behavior of non-Newtonian fluids like ferro liquids, liquid polymers, and any fluid with suspended particles in it. One of many applications is to model nanofluids, where inserting nanoparticles can change physical properties in a desired way depending on the concentration of this. Like is the case of fluid heat transfer systems where nanoparticles are inserted to increase heat conductivity for numerous applications. Nanofluids are better modeled using the micropolar fluids theory. This takes into account the conservation of angular momentum of the nanoparticles that are not described by the regular Navier-Stokes equations.

Micropolar fluids consist of randomly oriented particles submerged in a viscous fluid where the deformation of the particles is neglected. Here we present the results for an incompressible nanofluid to represent natural convection in the heat driven cavity, using Boussinesq approximation for buoyancy effects. To evaluate the effect of nanoparticles over fluid properties a variation of model parameters will be computed and compared against conventional Navier-Stokes results. We modelled the system using the finite element method with B-splines basis functions, where to overcome the incompressibility constraint we used a divergence conforming space discretization [3, 4], obtaining point-
wise divergence free results.

REFERENCES


