1014-65-1 **Atife Caglar*** (caglara@uwgb.edu), University Of Wisconsin, 2420 Nicolet Dr, Green Bay, WI 54302, and **Anastasios Liakos** (liakos@usna.edu), US Naval Academy, Annapolis, MD 21402.
No-Slip Boundary Conditions for Navier-Stokes Equations by a Penalty Method.

We prove convergence of the finite element method for the Navier-Stokes equations in which the no-slip condition and the no-penetration condition on flow boundary, are both imposed by penalty methods. This approach has been studied for the Stokes problem but it has not progressed beyond the linear Stokes problem. Since the inertial effects dominate the motivating application, it is crucial to extend the validity of the method to the non-linear Navier-Stokes case. We have started this extension, analyzed the method, and given numerical results. We have shown that optimal order of convergence can be achieved if the computational boundary follows the real flow boundary exactly.

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