Timo Heister, Maxim Olshanskii and Leo Rebholz* (rebholz@clemson.edu). Natural vorticity boundary conditions for solid walls and application to velocity-vorticity methods for Navier-Stokes equations. Preliminary report.

We derive boundary conditions for the vorticity equation with solid wall boundaries. The formulation uses a Dirichlet condition for the normal component of vorticity, and Neumann type conditions for the tangential components. In a Galerkin (integral) formulation the tangential condition is natural, i.e. it is enforced by a right-hand side functional and does not impose a boundary constraint on trial and test spaces. The functional involves the pressure variable, and we discuss several velocity-vorticity formulations where the proposed condition is appropriate. Several numerical experiments are given that illustrate the validity of the approach. (Received February 06, 2015)