1077-65-1583 **Aycil Cesmelioglu*** (aycil.cesmelioglu@gmail.com), **Bernardo Cockburn**, **Ngoc Cuong Nguyen** and **Jaime Peraire**. *Analysis of HDG methods for the Navier-Stokes equations.* Preliminary report.

In this work, we propose and analyze a hybridizable discontinuous Galerkin (HDG) method for the incompressible stationary Navier-Stokes problem. First, we analyze the corresponding method for the Oseen equations which can be thought of as a linearized version of the Navier-Stokes equations. In fact, to approximate the Navier-Stokes flow, a common approach is to use Picard iterations where an Oseen problem is solved at each step. We first show that the HDG method for the Oseen problem yields optimal convergence for the velocity, its gradient and the pressure if we use the same polynomial degree to approximate all of the unknowns. With a special projection and postprocessing, we further obtain a H(div)-conforming, divergence-free velocity which converges with an additional order. We show numerical examples to validate the theoretical convergence rates. Finally, we extend these results to the Navier-Stokes case by solving a sequence of Oseen equations. (Received September 20, 2011)