Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

**Optimal actuator and sensor placement in the linearized complex Ginzburg-Landau system**[1] KEVIN CHEN, CLARENCE ROWLEY, Princeton University — The linearized complex Ginzburg-Landau equation is a model for the evolution of small fluid perturbations, such as in a bluff body wake. We control this system by implementing actuators and sensors and designing an $H_2$-optimal controller. We seek the optimal actuator and sensor placement that minimizes the $H_2$ norm of the controlled system, from flow disturbances to a cost on the perturbation and input magnitude. We formulate the gradient of the $H_2$ squared norm with respect to actuator and sensor positions, and iterate toward the optimal position. With a single actuator and sensor, it is optimal to place the actuator just upstream of the origin (e.g., the bluff body object) and the sensor just downstream. With multiple but an equal number of actuators and sensors, it is optimal to arrange them in pairs, placing actuators slightly upstream of sensors, and scattering pairs throughout the spatial domain. Global mode and Gramian analyses fail to predict the optimal placement; they produce $H_2$ norms about five times higher than at the true optimum. A wave maker formulation is better able to guess an initial condition for the iterator.

[1]This work was supported by the DOD NDSEG Fellowship Program.

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Date submitted: 23 Jul 2010 Electronic form version 1.4