1056-35-1327 **Irena Lasiecka** and **Amjad Tuffaha*** (tuffaha@usc.edu), University of Southern California, 3620 South Vermont Ave., KAP 108, Los Angeles, CA 90089. *Bolza boundary control problem for a fluid-structure interaction model.*

We consider a Bolza boundary control problem for a fluid structure interaction model consisting of a linearized Navier-Stokes equation coupled with a dynamic wave equation. The model incorporates convective terms resulting from the linearization of the Navier-Stokes equation around equilibrium. The existence of the optimal control and its feedback characterization via a solution to a Riccati equation is established. The main difficulty is caused by unbounded action of control forces which, in turn, result in Riccati equations with unbounded coefficients and in singular behavior of the gain operator. This class of problems has been recently studied via the so called Singular Estimate Control Systems (SECS) theory. It is shown that the fluid-structure interaction does satisfy the Singular Estimate (SE) condition. This is accomplished by proving that the maximal abstract parabolic regularity is transported via hidden hyperbolic regularity of the boundary traces on the interface. The Singular Estimate permits application of recently developed general theory which implies well-posedness of the feedback synthesis and of the associated Riccati Equation. Moreover, the singularities in the optimal control and in the feedback operator at the terminal time are quantitatively described. (Received September 21, 2009)