Boundary control of thermally coupled flow problems

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The investigation of the optimal control of thermally coupled flow problems will be presented. These are simplified models of a semiconductor melts. The flow is governed by the Boussinesq approximation of the Navier-Stokes system. The control goal consists in tracking of a prescribed flow field. As control action we consider Dirichlet boundary control. The first order optimality conditions represent a coupled system consisting of the Boussinesq equations, an backward in time adjoint equation, and a boundary value problem for the boundary control temperature. Numerically we solve this system by damped Picard iteration and present results for twodimensional and threedimensional model problems for zone melting and Czochralski configurations.