

Optimal Control of Natural Convection-Radiation in Glass Melting Furnaces

O. Tse¹ and R. Pinnau²

Abstract: We consider optimal control problems for the Boussinesq-approximation coupled to the simplified P_3 -approximation, for radiation, which allows for the modeling of conducting, convecting, radiating fluids. We present existence, uniqueness and regularity results of bounded states. We further provide an analysis of the optimal control problem with cost functionals of tracking-type, where we show the existence of an optimal control, derive the first-order optimality system and analyze the adjoint system. To underline the feasibility of the approach, we present numerical results based on a first-order descent method using adjoint information.

^{1,2} Department of Mathematics, University of Kaiserslautern
Erwin Schrödinger Straße, 67663 Kaiserslautern, Germany
tse@mathematik.uni-kl.de, pinnau@mathematik.uni-kl.de