1116-35-1631 **Bruno Giuseppe Poggi Cevallos*** (poggi008@umn.edu), Minneapolis, MN 55455, and **Ugur G. Abdulla** (abdulla@fit.edu), 150 West University Blvd., Crawford 204, Melbourne, FL 32901.

Optimal Control of the Multiphase Stefan Problem.

We consider the inverse multiphase Stefan problem, where information on the heat flux on the fixed boundary is missing and must be found along with the temperature and free boundaries. Optimal control framework is pursued, where boundary heat flux is the control, and optimality criteria consists of the minimization of the L_2-norm declination of the trace of the solution to the Stefan problem from the temperature measurement on the fixed right boundary. State vector solves multiphase Stefan problem in a weak formulation, which is equivalent to Neumann problem for the quasilinear parabolic PDE with discontinuous coefficient. Full discretization through finite differences is implemented and discrete optimal control problem is introduced. We prove well-posedness in Sobolev spaces framework and convergence of discrete optimal control problems to the original problem both with respect to cost functional and control. Along the way the convergence of the method of finite differences for the weak solution of the multiphase Stefan problem is proved. The proof is based on achieving a uniform L_∞ bound, and $W_2^{1,1}$-energy estimate for the discrete multiphase Stefan problem. (Received September 20, 2015)