1106-35-2581 **Ugur Abdulla** and **Jonathan Goldfarb*** (jgoldfar@fit.edu). *Numerical Methods for Solving Optimal Control Problems for the Second Order Parabolic PDEs.*

We consider inverse Stefan problem where information on the heat flux on the fixed boundary is missing and must be found along with the temperature and free boundary. We employ an optimal control framework where boundary heat flux and free boundary are components of the control vector and optimality criteria consists of the minimization of the sum of L_2-norm declinations from the measurement of the temperature at the final moment and information on the phase transition temperature on the free boundary. This approach allows one to tackle situations when the phase transition temperature is not known explicitly, but is available through measurement with possible error. Well-posedness in a Sobolev spaces framework is proved and the convergence of semi-discrete optimal control problems to the original problem both with respect to cost functional and control is established. Fréchet differentiability of the continuous and discrete problems is considered. The method of proof lends itself to the development of iterative numerical methods of lower computational cost since for every given control vector the parabolic PDE is solved in a fixed region instead of full free boundary problem. The numerical method is implemented to solve example problems with nonsmooth data. (Received September 16, 2014)