1079-35-116 **Ugur G Abdulla*** (abdulla@fit.edu), 150 West Univ Blvd, Melbourne, FL 32901, and **Ogugua Onyejekwe** (oonyejek@fit.edu), Melbourne, FL 32901. *On the Inverse Stefan Problem.*

We develop a new variational formulation of the 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 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 available measurement of the temperature flux on the fixed boundary and available 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, and is available through measurement with possible error. It also allows for the development of iterative numerical methods of least computational cost due to the fact that for every given control vector, the parabolic PDE is solved in a fixed region instead of full free boundary problem. We prove well-posedness in Sobolev spaces framework, Frechet differentiability and convergence of discrete optimal control problems to the original problem both with respect to cost functional and control. (Received January 03, 2012)