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Ugur G. Abdulla* (abdulla@fit.edu), Melbourne, FL 32901. *Recent Advances on Inverse Parabolic Free Boundary Problems.*

This talk presents recent advances on inverse Stefan type parabolic free boundary problems, where some of the coefficients of the PDE or some boundary data on the fixed boundary is missing and must be found along with the temperature and free boundary. We discuss both one-phase and multiphase cases. In one-phase case optimal control framework is employed where missing data and free boundary are components of the control vector. Multiphase optimal Stefan problem is reduced to optimal control problem for quasilinear PDE with discontinuous coefficient. We prove the well-posedness of the optimal control problem and the convergence of the sequence of the discrete optimal control problems to the original problem both with respect to cost functional and optimal control. We prove the Frechet differentiability in Besov spaces, necessary condition for optimality, Pontryagin type maximum principle under minimal regularity assumptions on the data. (Received September 19, 2016)