1125-35-2626 **U. G. Abdulla** (abdulla@fit.edu), 150 W. University Blvd, Mathematical Sciences Department, Melbourne, FL 32901, and **J. G. Goldfarb*** (jgoldfar@fit.edu), 150 W. University Blvd., Mathematical Sciences Department, Melbourne, FL 32901. *Frechet Differentiability in Besov Spaces in the Optimal Control of Parabolic Free Boundary Problems.*

We consider the inverse Stefan type free boundary problem, where information on the boundary heat flux and density of the sources are missing and must be found along with the temperature and the free boundary. We pursue optimal control framework where boundary heat flux, density of sources, and free boundary are components of the control vector. We prove the Frechet differentiability in Besov spaces, and derive the formula for the Frechet differential under minimal regularity assumptions on the data. The result implies a necessary condition for optimal control and opens the way to the application of projective gradient methods in Besov spaces for the numerical solution of the inverse Stefan problem. (Received September 20, 2016)