1135-65-2877 **Yekaterina Epshteyn**, **Kyle R. Steffen*** (steffen@math.utah.edu) and **Qing Xia**. *Towards a Difference Potentials Method for the Mullins–Sekerka model.*

A classical problem in mathematical physics is the study of solidification or liquidation of materials. The Mullins–Sekerka model arises in the limit when interfacial motion is slow, relative to heat conduction. It is an elliptic free-boundary problem, with Laplace's equation, a Dirichlet boundary condition, and an interface evolution equation. Instabilities and dendritic growth are interesting phenomena which can occur for an interface between a bounded domain and its complement in all of $\mathbb{R}^3$.

The Difference Potentials Method (DPM) is a framework for the high-order accurate and efficient numerical solution of partial differential equations (PDE). It naturally permits the use of uniform grids, which need not conform with boundaries or interfaces. With the DPM, one can consider general boundary or interface conditions, with no change to the discretization of the PDE. Moreover, one can achieve spectral accuracy in the approximation of the solution near boundaries or interfaces.

In this talk (based on joint work with Y. Epshteyn and Q. Xia), I will discuss recent work towards a DPM for the Mullins–Sekerka model, including accurate treatment of the unbounded domain (replaced by a finite domain and an exact artificial boundary condition) and the moving interface. (Received September 26, 2017)