

## **Gradient formulations with flow maps - mathematical and numerical approaches to free boundary problems**

Dr. Dirk Peschka (WIAS Berlin)

### **Abstract:**

For a wide class of practically relevant problems the motion of free boundaries is highly relevant and a major source of mathematical difficulty. At the same time, it is often desirable that the corresponding coupled continuum models feature thermodynamic consistency in the sense that the rate of change of a certain thermodynamic functional has a sign.

Variational modeling of corresponding flows using flow maps is able to address some of the mathematical difficulties in a systematic way but automatically satisfies the thermodynamic consistency. In this talk, I will point out different applications and consider the free boundary problem with moving contact lines as the main application. It will be shown how dynamic contact angles can emerge naturally from a gradient flow framework and how this naturally leads to a weak formulation amenable for numerical discretization.