The Stefan problem: wellposedness and regularity of the solution in 1d.

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Abstract.

In this seminar we will discuss the Stefan problem, which is one of the most famous free-boundary problems. The situation that we want to model is the melting of ice, where indeed the border that separates water from ice changes over time. Hence, the evolution of the boundary itself becomes part of the unknown – along with the temperature of the system – and our main goal is to study the wellposedness of the problem.

In particular, the first part of the seminar will be dedicated to establish a local existence and uniqueness result on Hölder spaces, via a successive approximations argument. In the end, we will see that the solution is actually global and smooth, and we will present some possible variants that generalize the initial model.

Bibliography.

M.E. Taylor, *Partial Differential Equations III: Nonlinear Equations*, Applied Mathematical Sciences, Springer, 2011.