

## **Numerical approximations of partial differential equations with singularities**

*Bjorn Enquist*

The lecture series will cover singularities of different strength in the solution of partial differential equations and their numerical approximation on regular computational grids. In particular we will discuss the following problems.

The Prandtl boundary layer equation is an approximation of the Navier-Stokes equations close to the boundary. We will analyze this equation and show finite time blow-up. Conservation law moment equations in geometrical optics may also have unbounded solutions. In this case of Dirac delta measure type. Their numerical solution will be discussed. The last part of the lectures will deal with numerical capturing methods of discontinuous solutions of nonlinear conservation laws and a general technology for regularization or singular components in wider classes of partial differential equations.