



## **Minisymposium 13 - Approximationsmethoden für Probleme auf der Sphäre**

### **Numerical inversion of the one-dimensional Radon transform on $SO(3)$**

RALF HIELSCHER (BERGAKADEMIE TU FREIBERG, INSTITUT FÜR GEOLOGIE)

We are concerned with the numerical inversion of the one-dimensional Radon transform on the rotational group  $SO(3)$  subject to a non-negativity constraint. While the Radon transform on  $\mathbb{R}^3$  attracted much attention during the last fifteen years due to its connection to tomography the Radon transform on  $SO(3)$  did not. Our problem has practical applications in texture analysis, i.e. the analysis of crystallographic preferred orientation in polycrystalline materials as metals or rocks. We characterize the Radon transform on  $SO(3)$  as an operator between Sobolev spaces and present a spline based inversion algorithm that is especially well suited for scattered data as they are provided by the application in mind. A core item of our algorithm is the fast non-uniform spherical Fourier transform.

Additionally, we introduce a framework that allows for some basic error estimates of the inverse transform.