Sonny Astani Department of Civil and Environmental Engineering Seminar

Title: Bayesian Inversion for Sensing in Bio-and Nanotechnology

Speaker: Professor Clemens Heitzinger, Technical University of Vienna

Tuesday, April 24,2018 11:00am-12:00pm, KAP 209

Abstract:

We use Bayesian inversion to extract as much information as possible in two sensing applications, namely in nanoelectrode-sensor arrays and in electrical impedance tomography. Computational Bayesian inversion provides us with the means not only to estimate unknown parameter values, but also their probability distributions and hence uncertainties in reconstructions. This approach also includes a physical model; in both applications considered here, the physical models are partial differential equations.

We present our algorithm for multi-dimensional Bayesian inversion and discuss numerical results for the (ill-posed) inverse problem in electrical impedance tomography (EIT), showing that certain properties of the internal objects are much harder to reconstruct. In the application of nano electrode-sensor arrays, we characterize the devices and show how various measurements at different frequencies can be combined, which increases accuracy owing both to physics and Bayesian inversion.

Bio:
Clemens Heitzinger is Associate Professor at the Institute for Analysis and Scientific Computing at the Technical University of Vienna. He is winner of a START Prize from the Austrian Science Fund to investigate PDE Models for Nanotechnology. His current interest are also in biological systems and devices as well as in stochastic models and uncertainty quantification.

http://www.heitzinger.info