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COMPUTATIONAL METHODS FOR INVERSE PROBLEMS: THEORY AND APPLICATIONS

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ABSTRACT

In engineering and science, there are abundant opportunities for leveraging computational methods for optimization, control, and characterization of complex systems through the utilization of sophisticated inverse solution strategies. Furthermore, the systematic study of inverse problems has revealed a number of unified approaches. These include, for example, computational formulations specifically tailored to inverse problems, novel optimization algorithms, and probabilistic formulations, among others. The availability of new sources of data, efficient computational resources, and novel experimental configurations continue to drive the field and reveal new facets for computational consideration.

The goal of this minisymposium is to bring together the state of the art in computational solution strategies to inverse problems in mechanics and mechanics-related areas. Although the presentation of work in diverse fields of application is welcome, an emphasis will be put on the general principles and on the computational aspects of the techniques discussed. Topics may include, but are not limited to:

- direct or optimization solution strategies;
- regularization approaches to combat ill-posedness;
- statistical and machine learning techniques;
- stochastic methods;
- uncertainty quantification and error analysis;
- inverse problems in biomechanics and bioimaging;
- nondestructive and noninvasive evaluation;
- inverse scattering problems;
- heat and mass transfer; and
- inverse problems in geophysics.