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Inverse Transport Problems and Photoacoustics

Inverse transport consists of reconstructing the optical parameters in a transport equation from knowledge of a measurement operator. We review several uniqueness and stability results obtained in the context of various boundary measurements as they arise, e.g., in optical tomography, a medical imaging modality. Accurate numerical reconstructions obtained by carefully capturing the singularities of the measurement operator are also briefly presented. I will also present recent results obtained for the inverse transport problem with internal controls as they arise in the application of photoacoustic tomography, a recent hybrid medical imaging modality that combines the large contrast observed in optical parameters with the high resolution of ultrasounds.

These are joint works with Alexandre Jollivet, Francois Monard, and Gunther Uhlmann.