A MODEL REDUCTION APPROACH FOR RTE-BASED FLUORESCENCE OPTICAL TOMOGRAPHY

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ABSTRACT

Fluorescence optical tomography (FOT) aims at determining the unknown concentration of a fluorophore within a semi-transparent object by optical measurements at the boundary. For describing the transport of light, the radiative transfer equation (RTE) is a widely accepted model. FOT then amounts to a linear inverse problem, in which the forward operator is described implicitly via the RTE [1].

In this talk, we study the stable and efficient numerical solution of the inverse problem of FOT by Tikhonov regularization. A model reduction approach is developed, which allows to approximate the forward problem by a quasi-optimal finite rank operator. By intensive use of an underlying tensor product structure of, the reduced model can be constructed at the cost of a single forward evaluation. The inverse problem can then be solved efficiently in an online manner [2].

References

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[2] J. Dölz, H. Egger, and M. Schlottbom. *A model reduction approach for inverse, problems with operator valued data*, Numer. Math. 148 (2021), 889–917.

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