

# Material derivatives of boundary integral operators in electromagnetism and application to inverse scattering problems

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In this talk we present the material derivative analysis of the boundary integral operators arising from the scattering theory of time-harmonic electromagnetic waves and its application to inverse problems. We present new results using the Piola transform of the boundary parametrisation to transport the integral operators on a fixed reference boundary. The transported integral operators are infinitely differentiable with respect to the parametrisations and simplified expressions of the material derivatives are obtained. Using these results, we extend a nonlinear integral equations approach developed for solving acoustic inverse obstacle scattering problems to electromagnetism. The algorithm has the interesting feature that it avoids the numerous numerical solution of boundary value problems at each iteration step. The effectiveness of the method is highlighted by numerical experiments.

This is a joint work with O. Ivanyshyn Yaman from Izmir Institute of Technology in Turkey.