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Object based Bayesian full-waveform inversion with topological priors

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We propose a full-waveform inversion scheme to detect inhomogeneities in a medium with quatified uncertainty [1]. First, we identify the most prominent anomalous regions by visualizing topological fields associated to functionals comparing the true recorded data with the data that would be obtained from a forward model by varying the geometry of the inhomogeneities and their material parameters. Then, we construct priors based on that information and develop a Bayesian inference framework. We study the posterior distribution over a finite parameter set representing the objects by Markov Chain Monte Carlo sampling and by sampling a Gaussian distribution found by linearization about the maximum a posteriori estimates. We demonstrate the approach on the Bayesian solution of 2D inverse problems in medical elastography and holography [2, 3, 4, 5].

References

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