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# Can PINNs beat FWI?

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Full waveform inversion (FWI) plays an important role in various applications such as subsurface characterization in geophysics, breast cancer detection in medicine, etc. FWI problems are usually formulated as optimization problems, where the forward-wave propagation operator maps the subsurface velocity structures to seismic signals. The existing computational methods for solving full-waveform inversion are computationally expensive and yield low-resolution results because of the ill-posedness and cycle skipping issues of full-waveform inversion. To resolve the problems, we employ machine learning techniques to do the full-waveform inversion. Specifically, we attempt to apply the physical informed neural networks (PINNs) to FWI, which naturally involve enforcing conservation laws and other physically meaningful constraints and enjoy high flexibility in placing sparse sensors in temporal-spatial domain.