Name: ParaArrayOpt

Purpose: Optimization of the seismometer array for Newtonian Noise (NN) cancellation. If the geology is simple enough, NN can be described analytically in the array optimization [1]. However, if this is not the case, the noise estimator (Wiener Filter, neural network, ...) must be newly derived/trained for each optimization step. To circumvent this, the tool will rely on neutral networks that are parametrized in the seismometer positions.

Components and status: In an early stage of development. We are currently working on NN mitigation techniques (see tool FraNC) and we have tested the parameterization of networks in different contexts, for example in [2].

Underlying models: deep learning (in particular GNNs), parameterized neural networks

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References

[1] F. Badarraco and J. Harms, Optimization of seismometer arrays for the cancellation of Newtonian noise from seismic body waves, Class. Quant. Grav. 36 (2019) 145006.

[2] J. Erdmann et al., ParaFlow: fast calorimeter simulations parameterized in upstream material configurations, arXiv:2503.21461.