

Generalized Mean-Field Theory of Phase Unwrapping via Multiple Interferograms

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Abstract : On the basis of Bayesian inference using the maximizer of the posterior marginal estimate, we carry out phase unwrapping using multiple interferograms via generalized mean-field theory. Numerical calculations for a typical wave-front in remote sensing using the synthetic aperture radar interferometry, phase diagram in hyper-parameter space clarifies that the present method succeeds in phase unwrapping perfectly under the constraint of surface- consistency condition, if the interferograms are not corrupted by any noises. Also, we find that prior is useful for extending a phase in which phase unwrapping under the constraint of the surface-consistency condition. These results are quantitatively confirmed by the Monte Carlo simulation.

Keywords : Bayesian inference, generalized mean-field theory, phase unwrapping, multiple interferograms, statistical mechanics

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