# DENOISING METHODS FOR SAR INTERFEROGRAMS

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**Abstract :** The Interferometric Synthetic Aperture Radar (InSAR) phase images, also called interferograms, are a powerful mean for extracting information about the ground surface by means of a digital terrain elevation models DEM. However, the interferogram is usually corrupted by noise due to many decorrelation factors (temporal, geometrical, atmospheric effects, etc), which increases the difficulty o fphase unwrapping and decreases the accuracy of DEM. Therefore, many research efforts have been engaged with the filtering of the interferometric phase.The existing filtering approaches are classified into two groups, the first approach uses direct filtering while the second approach is a transformation-domain filtering. We present in this research work five denoising techniques, some of these methods have been already proposed for the InSAR phase filtering such as the wavelet thresholding and the nonlinear diffusion filter.The first filter is implemented using different combinations of thresholds and shrinkage rules, considering different decomposition levels in the wavelet domain. The second filter is an iterative technique, the diffusion process should stop after a fixed number of iterations. Other methods have given a very satisfying quantitative and qualitative results in image denoising, hence we thought about introducing them for interferogram denoising, namely three methods. The first one is the correctional Wiener filtering that employs a correction factor, adopting different window sizes. The second method is acombination of wavelet thresholding and Wiener filtering. The third denoising technique is the wavelet diffusion filter that performs diffusion in the wavelet domain, using diffusion-inspired shrinkage functions.The filters are applied on simulated and real InSAR data, directly extracted from two single-look complex images acquired over the forest of Tapajós in Brazil, using an airborne SAR. The experimental results using the real interferogram seem to be consistent with the simulation results. It was shown that the wavelet diffusion filter and the Wiener-wavelet combined method are really promising for interferogram denoising, with good quantitative and qualitative results.

**Keywords :** InSAR, Interferometrie, Filtrage, ondelettes, Wiener, diffusion.