

Foucher, S., Farage, G. and Béné, G. B. "Polarimetric SAR image filtering with trace-based partial differential equations" *Canadian Journal on Remote Sensing*, 33 (3) June 2007 : 226-236.

Abstract

Partial differential equations (PDEs) filtering methods provide regularization of an image through successive iterations, where pixel values are gradually diffused in accordance with a local diffusion tensor field. The local diffusion tensor field determines the local smoothing geometry that should drive the regularization process. Most diffusion-based filtering methods rely on a divergence formulation for the diffusion term which does not produce an optimal geometry-preserving regularization. A new trace-based PDE approach was recently proposed and has been applied to the filtering of colour images and other multivalued data. Compared to a classical divergence-based formulation approach, a trace-based formulation better preserves the geometric content of the image. We propose to apply this new framework to the filtering of polarimetric synthetic aperture radar (PolSAR) images. In particular, the calculation of the local geometry is modified to be robust to the speckle noise. Speckle reduction performance is evaluated on both artificial and real PolSAR images and compared with other standard speckle reduction filters in terms of radiometric noise reduction and meaningful details preservation.