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*Edge-Enhancing Speckle Denoising for Ultrasound Images.*

Ultrasound images contain pervasive granularity which interferes with human analysis and automated processing of the images. Presently, professionals tolerate this granularity and are expected to work around it. As the medical community moves closer and closer to a digital standard of operation, fast and effective ultrasound denoising must account for the disparity in image quality between ultrasound and more robust, though more expensive, imaging techniques. Towards removing this granularity we develop an edge-enhancing denoising model which treats the granules in ultrasound images as speckle noise. Our partial differential equation based model, derived from a minimizing functional constrained by a new noise equation, is more efficient in removing speckle noise in ultrasound images than the existing models. A corresponding explicit time-stepping scheme from a non-standard finite difference discretization is proven to be stable. We also discuss and evaluate some parameterization techniques. Our scheme compares favorably with existing techniques, providing smooth results very quickly. Images clarified by our scheme are shown to be much more suitable for further automated processing tasks. (Received September 21, 2010)