Application of Splitting Scheme and Multigrid Method for TV-Stokes Denoising

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Abstract. Based on some previous work about the connection between image restoration and fluid dynamics, we apply a two-step algorithm for image denoising. In the first step, we use a splitting scheme to study a nonlinear Stokes equation so that tangent vectors are obtained. We propose a continuous boundary condition in this paper. In the second step, we reconstruct image fitting the computed tangent directions by solving nonlinear partial equations. We apply a fixed point iteration to solve the total variation-based image denoising problem, and use algebraic multigrid method to solve the corresponding linear equations. Numerical results demonstrate that our algorithm is efficient and robust and boundary conditions are satisfactory for image denoising.

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