

# Fast Multilevel Algorithms for Nonlinear Variational Imaging Models

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## Abstract:

In recent years, there has been much progress in modeling a class of high resolution image processing problems using nonlinear variational imaging models. Dramatic improvements have been achieved for these problems over the traditional linear and filter type methods. However there was much less work done in developing fast solvers for these new models. Such work must deal with either optimising non-smooth and non-differentiable functionals or solving nonlinear partial differential equations with discontinuous and highly non-smooth coefficients. In this talk, I shall first review recent multilevel work on Gaussian noise removal in this direction, in collaboration with colleagues including T F Chan (UCLA) and J Savage (Liverpool).

Then I shall present some new work on Poisson noise removal carried out at CUHK in collaboration with R H Chan. Our work is more challenging than and different from related work for solving Markov random field models, which use non-rotationally-invariant semi-norm in regularisation.