

# Multigrid Methods for Regularized Problems

Scott MacLachlan<sup>1</sup>

For many inverse problems, regularization is a key step in ensuring fidelity of the recovered solution and overcoming noisy data or uncertain forward models. For imaging problems, in particular, classical regularization based on the L2 norm of the solution gradient is well-known to be a poor choice, as it fails to preserve natural edges in the recovered solution, and so minimization based on the L1 norm or total variation is generally preferred. In this talk, we consider solution of the sequence of linear systems that arise when such a regularized problem is solved using a reweighed least-squares approach to resolve the regularization term. Particular attention is paid to the selection of components of a multigrid preconditioner for different ranges of the regularization parameter value. This is joint work with Matthias Bolten and Misha Kilmer.

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<sup>1</sup>Memorial University of Newfoundland, Canada (smaclachlan@mun.ca)