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**Parimah Kazemi\*** (kazemip@beloit.edu), Beloit College, Department of Mathematics, 800 College Street, Beloit, WI 53511, and **Robert Renka**. *A Levenberg-Marquardt method using Sobolev gradients.*

In order to numerically solve nonlinear least squares problems, the Levenberg-Marquardt method presents an attractive option. By combining the Gauss-Newton direction with a gradient descent direction obtained from a Sobolev metric, we obtain a more efficient method for numerical optimization than the traditional Levenberg-Marquardt method gives. We demonstrate this by applying our scheme to numerically find minimizers of the Ginzburg-Landau energy in the presence of a magnetic field. As we treat the optimization problem in the continuous setting, we are able to derive a scheme for obtaining the Levenberg-Marquardt parameter in this setting and thus we do not need to rely on heuristic arguments. (Received September 05, 2013)