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Michele Coti Zelati* (micotize@umd.edu). *Nonlinear lower bounds for the fractional laplacian and applications.*

We analyze the regularity and asymptotic behavior of solutions to the so-called surface quasi-geostrophic equations. Most the results are obtained via the nonlinear lower bounds on the fractional Laplace operator recently discovered by P. Constantin and V. Vicol. We will provide several instances which show the robustness and flexibility of this approach, specifically for the derivation of optimal Sobolev and Holder estimates, which may be of independent interest. (Received September 13, 2015)