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Timur Akhunov* (takhunov@ur.rochester.edu), Hylan building office 820, University of Rochester, Rochester, NY 14607, and **Cristian Rios**. *Hypoellipticity beyond Hormander's bracket criterion*. Preliminary report.

Elliptic differential equations are a natural generalization of the Laplace equation, one of the most intensely studied differential equations. These equations arise in modeling a wide variety of natural phenomena, with fluid motion and population dynamics being some of the examples. A key question in the analysis of such equations is the possibility of singularities and shocks. One of the mathematical formulations of such phenomena, going back to the influential work of Leon Schwartz, is the question of hypoellipticity. Namely, do smooth input always lead to smooth solutions for a given equation? Or are rough distributional solutions, that may even fail to be functions, possible? Even for linear equations, where the superposition principle holds, this question is highly nontrivial for degenerate elliptic equations. Little is known beyond the famous "bracket condition" of Lars Hormander. We hope that you will get interested in some new progress in this exciting field. (Received September 03, 2014)