De Giorgi and Moser Techniques for Elliptic Equations

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Abstract

In this mini-course we present and compare two different approaches of the study of regularity of weak solutions to scalar elliptic equations. The first method is based on the use of De Giorgi's level sets technique extended later by Ladyzhenskaya and Uraltseva for a large class of elliptic and parabolic PDEs. The second method is based on the use of iteration technique originated from Moser. As both approaches allow to obtain essentially the same results, the choice of a particular method is a matter of taste or is due to the specifics of the problem under the study. Though to explain the main ideas of both methods we use a simplest elliptic equation in the divergence form as our model example, the presented technique can be extended to a wide class of scalar problems such as elliptic and parabolic PDEs with lower order coefficients, equations in non-divergence form, some nonlinear PDEs etc.