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Diperna memorial lecture

John Ball, Oxford University & Institute for Advanced Study, Princeton

The regularity of minimizers in elasticity

It is a major open problem of nonlinear elasticity theory to decide whether or not energy minimizers are smooth or can have singularities. Although some singular minimizers related to phase transformations or fracture are known, there remains the possibility that there is a large class of realistic stored-energy functions for which minimizers are smooth. On the other hand there is apparently not a single example known of a stored-energy function for which smoothness can be proved for arbitrary large boundary data. The talk will survey what is known about this problem, and about related questions such as satisfaction of the Euler-Lagrange equation and uniform positivity of the Jacobian.