The governing PDEs of nonlinear elasticity and the Hilbert-Smith conjecture

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ABSTRACT

In this talk we explore an interesting circle of ideas. The governing PDEs of nonlinear elastcity, conformal geometry and other theories of mappings are the Beltrami systems. In two dimensions, due to the work of Morrey in the 30's, the theory of these equations is more or less completely understood. In higher dimensions these equations are highly nonlinear and overdetermined, and very little is known. Here we relate the questions of unique analytic continuation for these systems to a central problem in the theory of transformation groups, namely the Hilbert-Smith Conjecture (the geometric version of Hilbert's 5th problem concerning Lie groups). We are able to solve this conjecture in the elliptic setting and present a surprising application to these PDEs.