Stability for solutions of wave equations

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Abstract

Given a wave equation with nonsmooth metric, we consider the stable dependence of the solution on the metric. In particular, we show that the solution depends uniformly continuously on the metric in the $C^{1,1}$ class, when the Cauchy data is in a range of Sobolev spaces. The proof is constructive and uses the wave packet approach to hyperbolic equations.

The result is motivated by an inverse problem in seismic imaging, where one wishes to determine the interior structure of Earth from acoustic measurements made on the surface.