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Infinitesimal rigidity of convex surfaces and the Hilbert-Einstein functional

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Smooth strictly convex surfaces in R3 are infinitesimally rigid, i.e. they allow no non-trivial deformations that would preserve their intrinsic metric in the first order. We give a new proof of this which is based on variations of the Hilbert-Einstein functional.
Instead of deforming the surface, we reduce the question to "warped product"-deformations of the metric in the domain bounded by the surface. By studying the second variation of the Hilbert-Einstein functional, we show that every deformation that preserves the boundary metric and leaves the interior metric Euclidean must be trivial. This implies the infinitesimal rigidity of the surface.

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