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Peter Sternberg* (sternber@indiana.edu), **Stan Alama**, **Lia Bronsard**, **Andres Contreras** and **Jiri Dadok**. *A degenerate isoperimetric problem and traveling waves to a Hamiltonian bi-stable system.*

We analyze a non-standard isoperimetric problem in the plane associated with a metric having degenerate conformal factor at two points. Under certain assumptions on the conformal factor, we establish the existence of curves of least length under a constraint associated with enclosed Euclidean area. As a motivation for and application of this isoperimetric problem, we identify these isoperimetric curves, appropriately parametrized, as traveling wave solutions to a bi-stable Hamiltonian system of PDE's. (Received July 16, 2015)