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GEOMETRIC BOUNDARY CONDITIONS FOR RICCI CURVATURE

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Abstract: The mass-minimizing definition of quasi-local mass leads naturally to a number of interesting geometric/PDE problems involving the existence and properties of variational critical metrics. It is particularly important to be able to find metrics with Ricci curvature satisfying an associated system on an asymptotically flat manifold with boundary conditions. Similar systems arise in Hamilton-Perelman theory, and elsewhere.

A function-theoretic formulation of the phase space for the 3+1 (ADM) Hamiltonian formulation of the Einstein equations, identifies the equations, including boundary conditions, which necessarily must be satisfied by any mass-critical ADM data. We show this system is elliptic, and under certain conditions admits solutions. Assuming conditions which ensure existence and local uniqueness, we find some interesting formulae describing the variation of quasi-local mass.

This is joint work with Pengzi Miao.