Dynamical stability of some warped product Poincare-Einstein metrics

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Abstract: Ricci flow was introduced in the 1980s to uniformize manifolds by their curvature and ideally end up with a metric of constant Ricci curvature. If one is interested in finding constant Ricci curvature metrics with other special geometric properties, one can couple Ricci flow with another equation (such as the harmonic map heat flow or Yang-Mills heat flow) to try to find these special structures. This is quite hard in general, but one way to determine if something will be found by the flow is to conduct stability analysis. That is, determine if a perturbation of a "stable" object will converge to a nearby object of the same kind (e.g. if a perturbation of an Einstein metric will flow to a nearby Einstein metric). This talk will first discuss the results in [1], which characterize the stability of Poincare-Einstein metrics (asymptotically hyperbolic Einstein metrics) under Ricci flow. We will then specialize to studying the stability of static solutions of Einstein's equations. This latter topic requires one to consider the Ricci flow coupled with a special case of the harmonic map heat flow known as the List flow (see [2]). We will also see that stability is equivalent to a local positive mass type result.

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References

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[2] B. List, *Evolution of an extended Ricci flow system*, Comm. Anal. Geom., **16**(5), (2008), pp. 1007–1048.