Geometry Seminar

Isoparametric hypersurfaces of Riemannian manifolds as initial data for the mean curvature flow

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Abstract. We show that the evolution of isoparametric hypersurfaces of Riemannian manifolds by the mean curvature flow is given by a reparametrization of the parallel family in short time, as long as the uniqueness of the mean curvature flow holds for the initial data and the corresponding ambient space. As an application, we provide a class of Riemannian manifolds that admit hypersurfaces with constant principal curvatures, which are not isoparametric hypersurfaces. Furthermore, for a class of ambient spaces, we show that the singularities developed by the mean curvature flow with isoparametric hypersurfaces as the initial data are Type I singularities. We apply our results to describe the evolution of isoparametric hypersurfaces by the mean curvature flow in ambient spaces with nonconstant sectional curvature, such as homogenous 3-manifolds $\mathbb{E}(\kappa, \tau)$ with 4-dimensional isometry groups, and Riemannian products $\mathbb{Q}^2_{c_1} \times \mathbb{Q}^2_{c_2}$ of space forms. This is a joint work with Felippe Guimarães and João Batista Marques dos Santos.