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Finite time singularities for the harmonic map flow in 2D with values into de sphere

We study singularity formation in the harmonic map flow from a two dimensional domain into the sphere. We show that for suitable initial conditions the flow develops a type II singularity at some point in finite time, we obtain obtain the rate and profile, and we analyze the stability of this phenomeon. We also obtain obtain solutions with multiple singularities and reverse bubbling. The rate and profile of blow up were derived formally by van den Berg, Hulshof and King (2003) and proved by Raphael and Schweyer (2013) in the class of 1-corrotationally symmetric maps. This is joint work with Manuel del Pino (Universidad de Chile) and Juncheng Wei (University of British Columbia).