Folds, Intersections, and Inflections for Smooth and Polyhedral Surfaces: Distinguishing Cylinders from Möbius Bands

Thomas Banchoff
Brown University
February 27th, 2013

Any simple closed curve on a surface has a strip neighborhood which is either a cylinder or a Möbius band, and when the surface is situated in Euclidean three-space, there are different geometric ways of distinguishing the two cases. Three related approaches are to check the way the curve intersects the fold curve of a projection to a plane, the self-intersection curves, or the “inflection curves”, all to be defined in the talk. These examples give an introduction to the extrinsic geometry of characteristic classes. The presentation will feature computer graphics illustrations and animations of surfaces in three- and four-space.