Oberseminar Nichtlineare Differentialgleichungen

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Differential geometric bifurcation problems in pde2path

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Abstract: This talk will broadly cover bifurcation problems in differential geometric partial differential equations. We will investigate a variety of such equations, primarily using the pde2path library Xcont.

We begin with the constant mean curvature equation and the family of spherical caps, where no bifurcation occurs. From this starting point, we will proceed to more complex problems, such as cylindrical axisymmetric constant mean curvature surfaces and their bifurcation into non-axisymmetric surfaces.

Next, we consider a model for the shape of bilayer membranes: the fourth-order Helfrich equation. This equation is particularly notable as a model for the shape of red blood cells. We will examine destabilizing bifurcations from spherical and cylindrical topologies. Notably, the latter case reveals interesting bifurcations into non-axisymmetric solutions.
This is joint work with Hannes Uecker.

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