Meeting: 1003, Atlanta, Georgia, SS 11A, AMS Special Session on Riemannian Geometry, I

1003-58-1527   **Henry C. Wente*** (`hwente@math.utoledo.edu`), Department of Mathematics, University of Toledo, Toledo, OH 43606. *Bifurcation Phenomena for the Volume-constrained Plateau Problem.* Preliminary report.

We study bifurcation and catastrophic phenomena in the setting of the Volume-constrained Plateau (or Douglas) problem. Solutions are constant mean curvature surfaces spanning given contours which minimize surface area subject to a volume constraint. With increasing volume one may encounter configuraitions for which the second variation of the area functional is no longer positive definite relative to volume preserving perturbations but only positive semi-definite. It becomes necessary to consider higher order variations. In particular, we study the case where one must consider the fourth variation as the third variation vanishes. The outcome determines the nature of the resulting cusp catastrophe. It could be subcritical or supercritical. We focus our attention on the case where the cmc surfaces are annular sections of Delaunay nodoids spanning two coaxial circles in parallel planes. In the minimal surface case, good examples are given by appropriate sections of catenoids or Enneper's surface.In this case the study of the fourth variation goes back to the work of H.A. Schwarz as is discussed in the book of J.C.C. Nitsche. (Received October 05, 2004)