

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

The compensation of Gaussian curvature in developable cones is local JIN WANG, THOMAS WITTEN, The James Franck Institute and The Department of Physics, The University of Chicago — We use the angular deficit scheme[1] to determine numerically the distribution of Gaussian curvature in developable cones(d-cones)[2] formed by forcing a flat elastic sheet into a circular container so that the sheet buckles. This provides a new way to confirm the vanishing of mean-curvature[3] at the rim where the sheet touches the container. This angular deficit scheme also allows us to explore the potential role of the Gauss-Bonnet theorem in explaining the mean-curvature vanishing phenomenon. The theorem's global constraint on curvature resembles the global conditions observed to be relevant for vanishing mean curvature. However, our result suggests that the Gauss-Bonnet theorem does not explain the vanishing of mean-curvature.

[1] V. Borrelli, F. Cazals, and J.-M. Morvan, *Computer Aided Geometric Design* **20**, 319 (2003).

[2] E. Cerda, S. Chaieb, F. Melo, and L. Mahadevan, *Nature* **401**, 46 (1999).

[3] T. Liang and T. A. Witten, *Phys. Rev. E* **73**, 046604 (2006).

Jin Wang
The James Franck Institute and The Department of Physics,
The University of Chicago

Date submitted: 17 Dec 2008

Electronic form version 1.4