

List of publications and conferences/talks

Publications:

- 1 N. Sultana, *Explicit parametrization of Delaunay surfaces in space forms via loop group methods*, Kobe J. Math. 22 (2005), 71-107.

Abstract: We compute explicit conformal parametrizations of Delaunay surfaces in each of the three space forms Euclidean 3-space \mathbb{R}^3 , spherical 3-space \mathbb{S}^3 and hyperbolic 3-space \mathbb{H}^3 by using the generalized Weierstrass type representation for constant mean curvature (CMC) surfaces established by J. Dorfmeister, F. Pedit and H. Wu.

- 2 W. Rossman and N. Sultana, *Morse index of constant mean curvature tori of revolution in the 3-sphere*, to appear in Illinois J. Math. (2007), [math.DG/0605127]

Abstract: We compute lower bounds for the Morse index and nullity of constant mean curvature tori of revolution in the three-dimensional unit sphere. In particular, all such tori have index at least five, with index growing at least linearly with respect to the number of the surfaces' bulges, and the index of such tori can be arbitrarily large.

- 3 W. Rossman and N. Sultana, *The spectra of Jacobi operators for of constant mean curvature tori of revolution in the 3-sphere*, to appear in Tokyo J. Math. (2007).

Abstract: We prove a theorem about elliptic Schrodinger operators with symmetric Schrodinger potential functions, defined on a function space over a closed loop. The result is similar to a known result for a function space on an interval with Dirichlet boundary conditions. These theorems provide accurate numerical methods for finding the spectra of those operators over either type of function space. As an application, we numerically compute the Morse index of constant mean curvature (CMC) tori of revolution in the unit 3-sphere \mathbb{S}^3 , confirming that every such torus has Morse index at least five, and showing that other known lower bounds for this Morse index are close to optimal.

- 4 N. Sultana, *Instability of constant mean curvature surfaces of revolution in spherically symmetric spaces* (submitted, 2007).

Abstract: We study the stability properties of constant mean curvature (CMC) surfaces of revolution in general simply-connected spherically symmetric 3-spaces, and in the particular case of a positive-definite 3-dimensional slice of Schwarzschild space. We derive their Jacobi operators, and then prove that closed CMC tori of revolution in such spaces are unstable, and finally numerically compute the Morse index of some minimal and closed non-minimal CMC surfaces of revolution in the slice of Schwarzschild space.

- 5 N. Sultana, *Explicit Area formula for Delaunay surfaces in three space-forms*, (submitted, 2007)

Abstract: We introduce the explicit area formula for the fundamental pieces of Delaunay surfaces in each of the three space forms Euclidean 3-space \mathbb{R}^3 , spherical 3-space \mathbb{S}^3 and hyperbolic 3-space \mathbb{H}^3 in terms of their weights.

Proceedings of Scientific Conference/talk:

- 1 N. Sultana, *Constant mean curvature surfaces in Schwarzschild space*, Kobe University Geometry Seminar, on January 15, 2004, Japan.
- 2 N. Sultana, *Explicit conformal parametrization of Delaunay surfaces in space forms*, CMS/CSHPM Summer Meeting, on June 4-6, 2005, Canada.
- 3 N. Sultana, *Delaunay surfaces via DPW method*, Tutorial on CMCLab: theory and experiments in surface theory, on June 30 July 1, 2005, Japan.

- 4 N. Sultana, *Explicit area formula for Delaunay surfaces in space forms in terms of Jacobi Elliptic function*, TMS & AMS joint International Conference, on December 14-18, 2005, Taiwan.
- 5 N. Sultana, *DPW method for producing constant mean curvature surfaces*, the 4th Graduate Student Topology Conference , on April 1-2, 2006, USA.
- 6 N. Sultana, *Area of fundamental pieces of Delaunay surfaces in space forms*, Lehigh University Geometry and Topology Conference, on June 8-10, 2006, Lehigh University, Bethlehem, PA, USA.
- 7 W. Rossman and N. Sultana, *Morse index of constant mean curvature tori of revolution in the 3-sphere*, Mathematical Society of Japan, Annual Meeting, on September, 2006, Japan.
- 8 N. Sultana, *CMC surfaces of revolution in spherically symmetric 3-manifolds*, colloquium on Nov.22, 2006, Kanazawa University, Japan.
- 9 N. Sultana, *Morse Index of constant mean curvature surfaces of revolution in the Schwarzschild space*, the PAGE 2007, International Congress on Pure and Applied Differential Geometry, April 10-13, Brussels, Belgium.
- 10 N. Sultana, *Constant mean curvature surfaces of revolution in spherically symmetric 3-manifolds, and their stability*, Differential Geometry Seminar on April 18, 2007, Osaka City University, Japan.
- 11 N. Sultana, *Constant mean curvature surfaces of revolution in the Schwarzschild space*, the Midwest Geometry Conference 2007, May 18-20, Iowa, USA.
- 12 N. Sultana, *Instability of constant mean curvature surfaces of revolution in spherically symmetric spaces*, the Third Russian-German Geometry Meeting, June 18-23, 2007, Saint-Petersburg, Russia.