

MATHEMATICS DEPARTMENT
North Carolina State University

DIFFERENTIAL EQUATIONS SEMINAR

Wednesday, September 25, 2002
2:35 p.m. 330 Harrelson Hall

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“Theoretical and numerical analysis of the
weighted minimal surface problem”

Abstract

The weighted minimal surface problem involving two media is discussed in this talk. The Euler-Lagrange equation is derived from the variational form. The solution is continuous, but the derivatives have a jump across the interface. The jump condition derived in this paper generalizes Snell’s law for the three-dimensional weighted minimal surface problem.

Numerical computation proves to be difficult. A time-dependent evolution equation is used to find a solution of the Euler-Lagrange equation. The solution is not globally unique; it depends on the initial data used in the evolution equation. A smoothing technique is used to suppress oscillations near the interface. We also use a re-initialization process to regularize the problem. The linear solver in the substitution process is a maximum-principle-preserving scheme for parabolic interface problems. Some numerical results are presented.

This is a joint work with Monica Torres of Northwest University and Hongkai Zhao of UC-Irvine

Graduate students are invited to attend.

Questions, comments, and offers to talk should be directed to Steve Schecter, 919-515-6533, schecter@math.ncsu.edu. Please visit the DE Seminar web page at <http://www.math.ncsu.edu/seminars.html>.