JGSP **67** (2024) 47–64

JOURNAL OF
Geometry and Symmetry in Physics
ISSN 1312-5192

SPECTRAL GEOMETRY OF UNDULOIDS

BILL B. DAILY

Communicated by John Oprea

This paper examines the eigenvalues and eigenfunctions of the Laplace operator associated with a set of mathematically defined surfaces which can be produced experimentally by attaching two equally sized rings to opposite poles of a soap bubble and separating the rings. The shapes produced are called unduloids. These calculations show 1) for a range of ring sizes, as a function of ring separation, the first indexed eigenvalue has a minimum, pointing to an "optimum" shape, and 2) given the eigenfunctions in the form of their differential equations and a preference for symmetry, the underlying unduloid geometry may be deduced.

MSC: 35R30, 53A05, 53A10, 53C42, 58J50
Keywords: Inverse problem, minimal surfaces, soap bubbles, spectral geometry, unduloid

Contents

doi: 10.7546/jgsp-67-2024-47-64