

UFSCar

DEPARTAMENTO DE MATEMÁTICA

COLÓQUIO

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Falará sobre:

The Spherical Parameterization of a Surface. Applications in Geometry, Bio-membranes and Continuum Mechanics.

Resumo. The spherical parameterization of a surface was introduced in 1880 by Gauss. In 1901, Minkowski introduced the support function as the scalar product $w = X \cdot N$ where X is a parameterization of a surface in R^m and N is the corresponding unit normal. The support function w encodes geometric information about the surface in a way that is very appealing to differential geometers. In the case of a minimal surface, w satisfies the scalar linear partial differential equation $\Delta w + 2w = 0$ where Δ is the spherical Laplacian. Using superposition, certain solutions of $\Delta w + 2w = 0$ can be used to construct many classical surfaces, such as the catenoid, the helicoid, Enneper's surface and Riemann's genus-one singly periodic minimal surface. A recent paper co-authored with V. Ramos Batista used ordinary Sturm-Liouville problems satisfied by the support function to bypass the difficulties in the analysis of elliptic integrals that arise when solving period problems. In addition to problems in minimal surface theory, we will also consider a number of problems in bio-membrane mechanics and elastic shell theory where a spherical parameterization leads to a convenient formulation that facilitates the determination of equilibrium shapes.

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