Instituto Universitario de Investigación de Matemáticas y Aplicaciones Universidad Zaragoza

Departamento de Matemáticas Universidad Zaragoza

Seminario Geometría y Topología

Conferencia

Por

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Título:

"Animación en 3D vía cuaterniones"

Abstract:

Hamilton found the quaternions **H** as very useful tools for modelling Mechanics in 3D. The quaternions are in fact the vectors in R^4 equipped with a product, and with a complex structure (C^2). More importantly S^3 are the quaternions of norm 1.

If we want to do animation, we are interested in expressing isometries (movements) of the Euclidean space in 3D. In fact, in navigation one is interested in the isometries of S^2, but they are the isometries in 3D that fix the origin. If we are interested in orientation preserving isometries that fix the origin, then we have the product of two reflections in intersecting reflection planes: i.e. a rotation whose axis is the intersection line of the reflecting planes. Remember that a rotation of R^3 is given by an orthogonal 3x3-matrix with determinant 1.

I learnt about S^2, S^3 and the group SO(3) of rotations of R^3 in this building of Maths (linear algebra and diff geometry of surfaces)

The goal of this talk is to convince you that the quaternions of norm 1, S^3 and SO(3) are the same, pardon, they are isomorphic. This gives a fast algorithm to draw rotations in 3D: SLERP (Spherical Linear Interpolation).

Fecha: Jueves, 30 de octubre de 2025
Hora: 16:00 h.
Lugar: Edificio de Matemáticas, Aula 5