DEPARTAMENTO DE GEOMETRÍA Y TOPOLOGÍA

GOBIERNO DE ESPAÑA · MINISTERIO DE CIENCIA E INNOVACIÓN

consolider ingenio 2010 i-math mathematica

Instituto de Matemática Interdisciplinar

Sistemas dinámicos y geometría: tres aproximaciones

Periodo de concentración 2009-2010

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"(Relative) mapping class group techniques in surface dynamics"

ABSTRACT :

In these lectures we will address the question : from a dynamical systems point of view, what can one learn about an orientation preserving diffeomorphism $f : S - S$ of a surface S from isotopy information?

Our starting point will be Thurston's classification of the mapping class group (i.e. the group of isotopy classes of orientation preserving homeomorphisms of S) of a closed orientable surface S. A key feature of this classification is that each isotopy class has a preferred element that minimizes complexity and whose dynamical invariants are computable. We will discuss and prove this theorem following.

More generally, one can consider the isotopy class of f relative to its invariant sets. An orientation preserving, fixed point free homeomorphism of the plane is called a *Brouwer homeomorphism*. The Brouwer translation theorem describes the extent to which a Brouwer homeomorphism behaves like a standard translation. This description makes use of *translation arcs, streamlines and Brouwer lines*. Using isotopy versions of these arcs and lines, one can classify [3] the possible isotopy classes of a Brouwer homemorphism relative to a finite number of its orbits. We will discuss this theorem and apply it to prove a fixed point theorem for homeomorphisms of the plane.

As time allows we will consider more recent results including the theorem that every non-trivial Hamiltonian diffeomorphism of a closed oriented surface of genus at least one has periodic points of arbitrarily high period. This makes use of the homotopy Brouwer theory mentioned above and includes a generalization of Thurston's classification theorem that produces a preferred element in the isotopy class of f relative to its fixed point set.

Organizado por el Departamento de Geometría y Topología, los Grupos de Investigación UCM "Geometría de las variedades proyectivas", "Análisis funcional no-lineal en espacios Banach" y "Teoría de la forma y la dinámica topológica"; el Proyecto i-math, y el IMI

Fecha: 18-23 de enero de 2010. Primera sesión el lunes 18 a las 10.15 horas (se establecerá el horario de las siguientes sesiones)

Seminario 225

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