CURSO DE DOCTORADO

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Qualitative properties of solutions to Monge-Ampère equations

Monge-Ampère equations are among the simplest and most extensively studied fully nonlinear PDE´s. They arise in a natural way in the consideration of various geometric problems, such for example the existence of a convex Surface with given curvature. In recent years Monge-Ampère equations have received a lot of attention for their role in several áreas of applied matemátics: as a new method of discretization of evolution equations of classical mechanics, like Euler equations, flow in porous media; as a simple model for optimal transportation and a div-curl decomposition with affine-invariance; as a model for front formation in meteorology and optimal antenna design. For these reasons in these lectures we will focus our attention on the following Dirichlet problem

$$\det D^2 u = f \qquad \text{in } \Omega$$
$$u = 0 \qquad \text{on } \partial\Omega$$

where Ω is a bounded domain, convex domain in R^n ($n \geq 2$). We will first study the existence and the uniqueness of classical solutions to (1) and we provide some regularity results. Then, we will describe how recent tolos in the theory of PDE´s can be used to discover qualitative properties of such solutions. For example, we will prove Sharp a priori estimates by using symmetrization techniques or shape derivatives. Then we will show symmetry results for solutions to overdetermined problems and finally we will extend all the previous results to Hessian equations.

**Organizado por el Instituto de Matemática Interdisciplinar (IMI)
con la colaboración del grupo MOMAT**

**Fechas: 21, 22, 23, 24 y 25 Noviembre de 2016
Horario: 11 horas (en la primera sesión se fijará el horario
para el resto de las sesiones).
Lugar: Aula 209 (Seminario Alberto Dou)
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