

Tools of the Mathematical Trade

Chennai Mathematical Institute is continuing with its series of lectures aimed at graduate students and interested researchers. The aim of these lectures, to be given by active researchers, is to expose different mathematical techniques that are important in current mathematical research.

Introduction to Intersection Theory and Motives

by

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Limited travel support and local hospitality is available for interested participants. Those interested should apply with a short CV to cat@cmi.ac.in before **December 25, 2009**.

Abstract

In this course, I would like to give an introduction to categories of motives. Starting from a category of algebraic varieties over a field k , a main step in their construction consists in enlarging the sets of morphisms in the following way. A morphism of varieties $f: X \rightarrow Y$ can be recovered from its graph Γ_f inside $X \times Y$. These graphs are the simplest examples of correspondences: a general correspondence is a formal linear combination of irreducible closed subvarieties in $X \times Y$ of suitable dimensions.

Difficulties arise when one wants to compose correspondences and this is where intersection theory appears. An algebraic cycle of codimension d on a variety X is a formal linear combination of irreducible closed subvarieties of X of codimension d . Correspondences are then a particular case of algebraic cycles. The study of their properties gives tools to construct categories of motives. The most technical ingredient lies in the definition of the intersection of two cycles: multiplicities have to be introduced in order to take into account some phenomena (e.g. if we intersect a parabola and a tangent line in the plane, the intersection cycle should be the contact point with multiplicity 2).

In this course, I would discuss some basic properties of intersection theory and then introduce categories of motives and do simple computation in them. If time permits it, I would deal with the theory until the definition of Voevodsky's triangulated category of mixed motives.

Schedule will be available at: <http://www.cmi.ac.in//activities/lecture-series/riou-feb2010.php>