Seminari de Geometria Algebraica 2007/2008 (UB-UPC)

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Growth of degrees of polynomial maps of $\mathbb{C}^2$ and dynamics III

Charles Favre
CNRS-IMJ,França

General abstract

Suppose one is given a dominant polynomial map $F : \mathbb{C}^2 \to \mathbb{C}^2$. Its degree $\deg(F)$ then determines its general behavior F near infinity.
When interested in the dynamics of F, one is naturally lead to study the sequence $\deg(F^n)$ and try to control it when n tends to infinity. The general aim of this mini-course is to describe in details this sequence following my recent work in collaboration with S. Boucksom and M. Jonsson. In particular we shall show that the sequence $\deg(F^n)^{1/n}$ admits a limit (called the asymptotic degree) which is always a quadratic integer; and that $\deg(F^n)$ satisfies a finite linear recurrence relation with integer coefficients. These results are the building blocks for a finer dynamical analysis of the map F.

Talk 3: Cohomological methods

To get a precise control of the growth of degrees, we look at the action of a polynomial map on the cohomology of the space X obtained by blowing up $\mathbb{P}^2$ at all points at infinity. The intersection form allows one to introduce a natural Hilbert space in this infinite dimensional vector space which is preserved by the action of polynomial maps. A spectral analysis of their actions gives the control of the sequence of degrees.
