CCSU
DEPARTMENT OF MATHEMATICAL SCIENCES
COLLOQUIUM

Friday, September 15
3:00 – 4:00 PM
Maria Sanford, Room 101

ALGEBRAIC CONSTANT MEAN CURVATURE HYPERSURFACES OF ORDER 3 IN EUCLIDEAN SPACES

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(Joint work with Vladimir G. Tkachev)

Abstract: There is a beautiful correspondence between algebra and geometry. In the case of two variables, this correspondence relates an equation with the set of points in the Cartesian plane that satisfy the equation. Basic examples are $x^2 + y^2=1$, $y= x^2$ and $y=x$, a circle of radius 1, a parabola and a line. When we have an equation with three variables the set of points in the three Euclidean space that satisfy the equation is most likely a two-dimensional manifold, i.e. a surface. For example, $x^2 + y^2+ z^2=1$ is a sphere of radius 1. In general, an equation with n+1 variables describes a n-dimensional manifold in the (n+1)-Euclidean space. A manifold whose dimension is one less than the ambient space is called a hypersurface. With this in mind, we have that most of the time an equation with n+1 variables describes a hypersurface in the (n+1)-dimensional space.

We can think that the most basic equations are those given by polynomials. Also, one of the most important hypersurfaces are those with constant mean curvature. It is easy to prove that the equation $x_1^2 + x_2^2 + ... + x_{n+1}^2 =r^2$ given by the polynomial of order two describes the n-dimensional sphere of radius r which is a hypersurface with constant mean curvature.

A natural question to ask is for the existence of other hypersurfaces, different from spheres, with non-zero constant mean curvature that are given by polynomial equations. In this talk we will prove that if the polynomial is of degree three then the hypersurface described by this polynomial cannot have a non-zero constant mean curvature.

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