Department of Mathematics Seminar

Surfaces containing two circles through each point

By

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Abstract: This is a joint work R. Krasauskas.

Motivated by potential applications in architecture, we find all analytic surfaces in 3-dimensional Euclidean space such that through each point of the surface one can draw two transversal circular arcs fully contained in the surface. The search for such surfaces traces back to the works of Darboux from XIXth century. We prove that such a surface is an image of a subset of one of the following sets under some composition of inversions:
- the set {p+q : p\in P,q\in Q}, where P and Q are two circles in 3-dimensional Euclidean space;
- the set {2[pxq]/|p+q|^2 : p\in P,q\in Q}, where P and Q are two circles in the unit 2-dimensional sphere;
- the set {(x,y,z): A(x,y,z,x^2+y^2+z^2)=0}, where A is a polynomial in R[x,y,z,t] of degree 2 or 1.

The proof uses a new factorization technique for quaternionic polynomials. We are also going to discuss recent variations of this result.

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Time: 15:30
Place: SA141 - Mathematics Seminar Room