Idaho State University

Department of Mathematics & Statistics

Colloquium

Continuants, Pfaffians, cross-ratios, and Lagrangian polygons

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4:00 pm
PS-308

We will define and "play with" the following mathematical objects. We will use only elementary linear algebra; no prior knowledge of any of the notions involved will be assumed. Our aim is to make the talk accessible to graduate students and undergraduate math majors.

(1) "Continuants" are certain tridiagonal matrices arising in difference equations and continued fractions.

(2) The determinant of a skew-symmetric matrix is the square of a polynomial in its entries known as the "Pfaffian".

(3) The classical cross-ratio is the unique projective invariant of four points on the projective line. The "symplectic cross-ratio" is a symplectic invariant of four points in a projective symplectic space.

(4) A polygon in a (2N-1)-dimensional projective symplectic space is said to be "Lagrangian" if every N consecutive vertices span a Lagrangian subspace of the parent 2N-dimensional symplectic space. In the critical case of (2N+2)-gons, there are N+1 symplectic cross-ratios, which form a complete set of symplectic invariants. These cross-ratios satisfy a single relation, the Pfaffian of their Gram matrix, which is a cyclic analog of the continuant.

For colloquium attendees, there will be light refreshments in PS-317 at 3:30 pm