Maximal partial ovoids in symplectic generalized quadrangles

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A (finite) generalized quadrangle of order \((s,t)\) is an incidence structure \(S = (P,B,I)\), in which \(P\) and \(B\) are disjoint (non-empty) sets of objects, called points and lines respectively, and for which \(I\) is a point-line incidence relation satisfying the following axioms: (i) each point is incident with \(t + 1\) lines \((t \geq 1)\) and two distinct points are incident with at most one line; (ii) each line is incident with \(s + 1\) points \((s \geq 1)\) and two distinct lines are incident with at most one point; (iii) if \(x\) is a point and \(L\) is a line not incident with \(x\), then there is a unique pair \((y,M) \in P \times B\) for which \(xIMyIL\).

The symplectic generalized quadrangle \(W(q)\), with \(q\) a prime power, consists of the points of the projective space \(PG(3,q)\), together with the totally isotropic lines with respect to a symplectic polarity.

A partial ovoid of a generalized quadrangle is a set \(O\) of points such that each line is incident with at most one point of \(O\). A partial ovoid is called maximal if it is not contained in a larger partial ovoid.

In this talk we will discuss techniques for exhaustive and heuristic computer searches for maximal partial ovoids and present some results in symplectic generalized quadrangles.