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8. Analysis

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Numerical range of S(phi)

We study properties of the numerical range W(T) of any completely nonunitary contraction T with rank (1 - T*T) = 1 on a finite-dimensional HIlbert space. We show that such operators are completely characterized by the so-called Poncelet property of their numerical ranges, namely, an n-dimensional contraction T is in the above class if and only if for any point z on the unit circle there is an (n+1)-gon which is inscribed in the unit circle, circumscribed about W(T) and has z as a vertex. We also determine a necessary and sufficient condition on the tangent points in order that the contraction with the above Poncelet property exists.
This is a joint work with Hwa-Long Gau.