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C O L L O Q U I U M

The convex invertible cone approach to Nevanlinna-Pick interpolation

Prof Sanne ter Horst *(North-West University)*

DATE: Monday, 22 September 2025 | 16h00–17h00 SAST

VENUES:

- **Stellenbosch University**: Neelsie Cinema
- **University of the Witwatersrand**: Room P215, 2nd Floor, Physics Building
- **North-West University**: Seminar Room K310, Physics Building G5
- **Online**

--- A recording of the talk will be published on the NITheCS YouTube channel afterwards ---

ABSTRACT

Nevanlinna-Pick interpolation is a classical topic that has its origin in complex analysis, and which has remained relevant due to it applications in control problems. In this talk we discuss a matrix point version of Nevanlinna-Pick interpolation for the class of positive, real odd functions. Such functions appear as the impedances of one-port electrical circuits generated by inductances and capacitors, as well as the transfer functions of lossless linear systems. The matrix-point formulation enables one to combine derivative conditions at several points, allowing for broader application, but also significantly increasing the complexity of the problem. This issue can be (partially) countered by using the right algebraic setting, which in this case appears to be the 'convex invertible cone' approach that originated in the work of Nir Cohen and Izchak Lewkowicz (2009). In the process, we are required to show for a class of linear matrix maps, that positivity and completely positive coincide. The talk is based on Joint work with Alma van der Merwe.

BIOGRAPHY

Sanne ter Horst received his PhD in Mathematics (Operator Theory) from VU Amsterdam in 2007, complemented by system and control theory training at the Dutch Institute of Systems and Control. Currently he is a full professor at North-West University. He serves as Editor-in-Chief of *Quaestiones Mathematicae*, is a member of the editorial board of Complex Analysis and Operator Theory, has held various portfolios on the council of the South African Mathematical Society since 2013, and is a Vice-President of the Steering Committee of the International Workshop on Operator Theory and its Applications conference series as well as a member of the Steering Committee of the International Symposia on Mathematical Theory of Networks and Systems. His research focuses on operator theory and matrix analysis with applications in systems and control theory, including metric constrained interpolation, unbounded Toeplitz operators, infinite-dimensional and noncommutative multidimensional systems.

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