Sanne ter Horst

North West University

Recent developments on equivalence after extension and Schur coupling

Abstract

Two Banach space operators $U : \mathcal{X}_1 \to \mathcal{X}_2$ and $V : \mathcal{Y}_1 \to \mathcal{Y}_2$ are said to be (a) *equivalent after extension* if there exist Banach spaces $\mathcal{X}_0$ and $\mathcal{Y}_0$ such that $U \dotplus I_{\mathcal{X}_0}$ and $V \dotplus \mathcal{Y}_0$ are equivalent and (b) *Schur coupled* in case there exists an operator matrix $\left[\begin{smallmatrix} A & B \\ C & D \end{smallmatrix}\right] : \left[\begin{smallmatrix} \mathcal{X}_1 \\ \mathcal{Y}_1 \end{smallmatrix}\right] \to \left[\begin{smallmatrix} \mathcal{X}_2 \\ \mathcal{Y}_2 \end{smallmatrix}\right]$ with A and D invertible and

$$U = A - BD^{-1}C, \quad V = D - CA^{-1}B.$$

In the 1990s Bart and Tsekanovskii [1, 2] studied the relation between these two notions, and the notion of *matricial coupling* which coincides with equivalence after extension, and proved that Schur coupling implies equivalence after extension. The converse question, whether equivalence after extension implies Schur coupling, was answered affirmatively only for rather special classes of operators, until recently [4, 5, 3]. In this talk we discuss some of these recent developments.

References

[1] H. Bart and V.E. Tsekanovskii, Matricial coupling and equivalence after extension, in: *Operator Theory and Complex Analysis*, OT **59**, 1992, pp. 143âĂŞ160.

[2] H. Bart and V.E. Tsekanovskii, Complementary Schur complements, *Linear Algebra Appl.* **197** (1994) 651-âĂŞ658.

[3] S. Ter Horst, M. Messerschmidt, and A.C.M. Ran, Equivalence after extension for compact operators on banach spaces, *J. Math. Anal. Appl.* **431** (2015), 136âĂŞ149.

[4] S. ter Horst and A.C.M. Ran, Equivalence after extension and matricial coupling coincide with Schur coupling, on separable Hilbert spaces, *Linear Algebra Appl.* **439** (2013), 793–805.

[5] D. Timotin, Schur coupling and related equivalence relations for operators on a Hilbert space, *Linear Algebra Appl.* **452** (2014), 106–119.

Talk time: 07/18/2016 5:00PM— 07/18/2016 5:20PM
Talk location: Cupples I Room 113

Special Session: State space methods in operator and function theory. Organized by J. Ball and S. ter Horst.