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DIFFUSIVE SYSTEMS AND WEIGHTED HANKEL OPERATORS

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Abstract. We consider diffusive systems, regarded as input/output systems with a kernel given as the Fourier–Borel transform of a measure in the left half-plane. Associated with these are a family of weighted Hankel integral operators, and we provide conditions for them to be bounded, Hilbert–Schmidt or nuclear, thereby generalizing results of Widom, Howland and others.

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REFERENCES

[1] A. BASHAR ABUSAKSAKA, *Properties of delay systems and diffusive systems*, Ph. D. thesis, University of Leeds (2015).
[2] F. F. BONSALL, *Boundedness of Hankel matrices*, J. London Math. Soc. (2) **29** (1984), no. 2, 289–300.
[3] C. CASENAVE AND G. MONTSENY, *Introduction to diffusive representation*, 4th IFAC syposium on system, structure and control, (2010), 15–17. https://hal.archives-ouvertes.fr/hal-00854381.
[4] E. B. DAVIES, *Linear operators and their spectra*, Cambridge Studies in Advanced Mathematics **106**, Cambridge University Press, Cambridge, 2007.
[5] K. GLOVER, R. F. CURTAIN AND J. R. PARTINGTON, *Realisation and approximation of linear infinite-dimensional systems with error bounds*, SIAM J. Control Optim. **26** (1988), no. 4, 863–898.
[6] K. GLOVER, J. LAM AND J. R. PARTINGTON, *Rational approximation of a class of infinite-dimensional systems: the L_2 case*, Progress in approximation theory, 405–440, Academic Press, Boston, MA, 1991.
[7] C. GUIVER AND M. R. OPMEER, *Model reduction by balanced truncation for systems with nuclear Hankel operators*, SIAM J. Control Optim. **52** (2014), no. 2, 1366–1401.
[8] J. S. HOWLAND, *Trace class Hankel operators*, Quart. J. Math. Oxford Ser. (2) **22** 1971 147–159.
[9] B. JACOB, J. R. PARTINGTON AND S. POTT, *On Laplace–Carleson embedding theorems*, J. Funct. Anal. **264** (2013), no. 3, 783–814.
[10] B. JACOB, J. R. PARTINGTON AND S. POTT, *Applications of Laplace–Carleson embeddings to admissibility and controllability*, SIAM J. Control Optim. **52** (2014), no. 2, 1299–1313.
[11] G. MONTSENY, *Diffusive representation of pseudo-differential time-operators*, ESAIM Proceedings **5** (1998), 159–175.
[12] G. MONTSENY, *Représentation diffusive*, Lavoisier Hermes-Science, Paris (2005).
[13] S. C. POWER, *Hankel operators on Hilbert space*, Research Notes in Mathematics **64**, Pitman (Advanced Publishing Program), Boston, Mass., London, 1982.
[14] H. WIDOM, *Hankel matrices*, Trans. Amer. Math. Soc. **121** (1966), 1–35.