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Nuclearity of some classical operators in function spaces

Nuclear operators were introduced by A.Grothendieck in 1955. They are a subclass of a family of linear compact operators and their eigenvalues are square summable. During this talk we consider two classes of classical operators acting in function spaces: embeddings of Sobolev type and Fourier transforms. We find sufficient and necessary conditions for the operators to be nuclear when they act between Besov or Triebel-Lizorkin spaces. We consider different situations when the Sobolev embeddings are compact: spaces on (quasi-)bounded domains, weighted spaces and spaces with a radial symmetry condition. Our method of prove is based on the wavelet characterization of the function spaces. As a by-product we prove a vector-valued version of Tong's theorem about nuclearity of embeddings of sequence ℓ_p spaces.

All the presented results are joint works with Dorothee D. Haroske, Hans-Gerd Leopold and Hans Triebel.

References.

[1] D.D. Haroske, H.-G. Leopold, and L. Skrzypczak. Nuclear embeddings in general vector-valued sequence spaces with an application to Sobolev embeddings of function spaces on quasi-bounded domains. *J. Complexity*, 69:101605, 2022.

[2] D.D. Haroske, L. Skrzypczak. Nuclear embeddings in weighted function spaces. Integr. Equ. Oper. Theory **92** (2020), Article no: 46, 37 pages.

[3] D. D. Haroske, L. Skrzypczak and H. Triebel Nuclear Fourier transforms, arXiv:2205.03128v1