

## Preface

This issue of the *Proceedings of the Estonian Academy of Sciences Physics, Mathematics* contains selected contributions to the Workshop on Trilinear Forms in Hilbert Space and Other Topics, which was held in Lund, 15–18 August 2005. This is the most recent of several workshops that have taken place in Lund on my initiative. The first of them was way back in 1982, an intimate workshop on interpolation theory with some 10 participants. The present one is a follow up to the Workshop on Trilinear Forms in Hilbert Space, which was held in Lund in August 2003. This time it was decided to expand the scope somewhat by including some related topics, mainly interpolation. Indeed, the two subjects go hand in hand. I was first attracted to trilinear and, more generally, to *multilinear* forms around 1980, via Hankel theory. The desire was to construct a theory of *singular values* and *Schatten–von Neumann classes* in this setting. Alas, this is an extremely difficult problem and we are still only in its very beginnings. Thus we have meanwhile focussed our attention on trilinear and multilinear forms in *finite dimensions*, although initially the problem was an infinite-dimensional one. In particular, we have addressed the problem of characterizing normalized trilinear forms of norm unity, or describing the *3-linear sphere*. For trilinear forms the most complete results have been obtained in the *two-dimensional* or *binary* case with real or complex scalars. More recently, interest has also turned to the case of *quaternions* and *octonions*, a *noncommutative* and a *nonassociative* situation, respectively.

This issue contains two papers by me, one with Thomas Kühn on imbedding constants in the commutative case, and another one with Bo Bernhardsson, Fernando Cobos, and Thomas Kühn in the case of quaternions. (So far we have no substantial results for octonions.)

In addition, there are several papers about interpolation. Let me here draw your attention to the paper of Michael Cwikel and Svante Janson, about a still open problem due to Calderón, and the paper of Leo Larsson and Lars-Erik Persson, on the connection between the celebrated Carlson’s inequality and interpolation. The interesting paper of Natan Kruglyak deals with  $K$ -closed couples of spaces of analytic functions, an area where ideas from the interpolation theory have found important applications in Fourier analysis.

Together with Sergei Silvestrov, with whom I have recently joined forces – he is an eminent specialist in operator algebras and operator theory –, and others, we have already begun to plan two more workshops, in 2007 and 2008, respectively.

Jaak Peetre  
on behalf of the Organizing Committee



Some participants in the Workshop.

First row (from left to right): Fernando Cobos, Michael Cwikel.  
Second row: Sergei Silvestrov, Svante Janson, Jonathan Arazy, Irina Asekritova,  
Natan Kruglyak, Jaak Peetre, Thomas Kühn, Mieczyslaw Mastylo.