

13. PAULI KOLLOQUIUM

Das Wolfgang Pauli Institut ladet zum **13. Pauli Kolloquium** ein, von **Wolfgang Hackbusch**.

Zeit: Dienstag, 2. Oktober 2012, 10:30 – 11:45

Ort: Hörsaal 1 im UZA2, Althanstrasse / Nordbergstrasse

(für WegBeschreibung siehe www.wpi.ac.at „practical information“)

- 1) **10.30 – 10.50 Uhr**
Coffee & Cake

- 2) **10.50 – 10.55 Uhr**
„Welcome address“ **Norbert J. Mauser** (WPI c/o Fak. Math. Uni Wien)

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- 3) **10.55 – 11.45 Uhr**

Wolfgang Hackbusch (Max Planck Institute Leipzig)

“The technique of hierarchical matrices”

Wolfgang Hackbusch (MPI Leipzig)

<http://www.>

"The technique of hierarchical matrices "

Abstract: The technique of hierarchical matrices allows to handle large-scale matrices arising from boundary value problems or integral equations, even if they are fully populated. In the case of FEM, the inverse or the triangular LU factors of the (sparse) matrix are examples of fully populated matrices. Boundary element methods yield always dense matrices.

The format of hierarchical matrices enables all matrix operations (addition, matrix-vector multiplication, matrix-matrix multiplication, LU decomposition, inversion) approximately. The additional approximation error is controllable and can be chosen, e.g., in size of the discretisation error.

The storage size as well as the operations of $n \times n$ matrices are almost linear in n , i.e., proportional to $n \cdot \log^p(n)$ for an exponent p depending on the spatial dimension.

Besides the solution of systems of linear equations, the technique can be used to compute matrix functions (e.g., $\exp(M)$) or to solve matrix equations, e.g., the Riccati equation arising in control theory.

Literature: W. Hackbusch: Hierarchische Matrizen. Springer, Berlin 2009

Short Biography:

Born 1948 in Westerstede.

Study of Mathematics at Marburg and Cologne Univ.,

Ph.D. Cologne Univ. (1973),

Habilitation for Mathematics Cologne Univ. (1979),

Professor Bochum Univ. (1980),

Professor of Applied Mathematics Kiel Univ. (1982),

Director and Scientific Member at the Max Planck Institute for Mathematics in the Sciences (since 1999),

Honorary Professor Leipzig Univ. Founding member of the Berlin-Brandenburg Academy of Sciences (1993),

Gottfried-Wilhelm-Leibniz Award of the DFG (1994),

Brouwer-Medal (1996),

Member of the German National Academy of Sciences Leopoldina (since 2006).