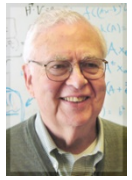
Villum Investigator Grant Inauguration

Professor Per Christian Hansen

Computational Uncertainty Quantification for Inverse Problems

The International experience

- 1985 PhD @ DTU, - SVD – theory and applications
  - 1986 Fulbright scholarship, Computer Science, Stanford University,



Gene Golub
SVD
”Matrix Comp.”

Cleve Moler
EIS/LIN-PACK
Matlab

Tony Chan
UCLA

Jack Dongarra
EIS/LIN-PACK
Oak Ridge

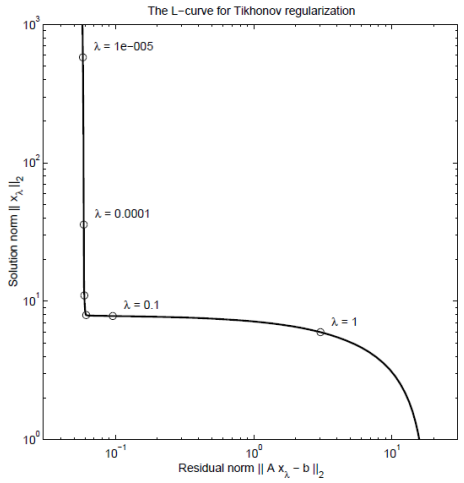
- 1988 Senior consultant, UNI•C – user and international collaboration
  - 1988 Oak Ridge National Laboratory
  - 1989 Mathematics, UCLA
  - 1990 Argonne National Laboratory
  - 1992 Mathematics, Berkeley, University of California

- 1996 Professor @ DTU Compute – consolidation of strong group in scientific computing
  - 2004 Emory University & 2006 Tufts University

The Research

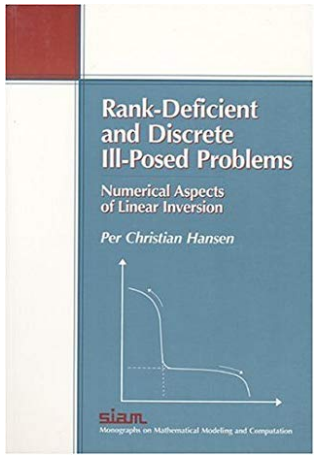
$$\min_x \{\|Ax - b\|^2 + \lambda^2 \|L(x - x_0)\|^2\}$$

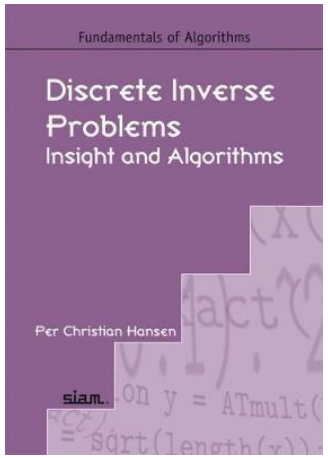
- The L-Curve method
  - P. C. Hansen, Analysis of discrete ill-posed problems by means of the L-curve, SIAM Review, 34(1992), pp. 561-580.
  - P. C. Hansen and D. P. O'Leary, The use of the L-curve in the regularization of discrete ill-posed problems, SIAM J. Sci. Comput., 14 (1993), pp. 1487-1503.

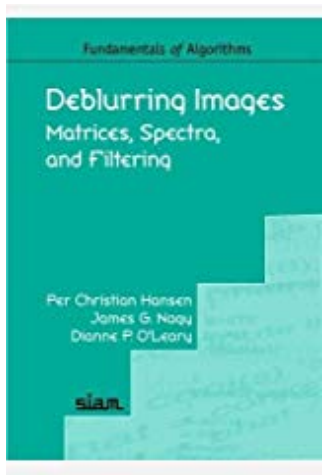


2005 ISI Web of Knowledge award as most cited Danish mathematician

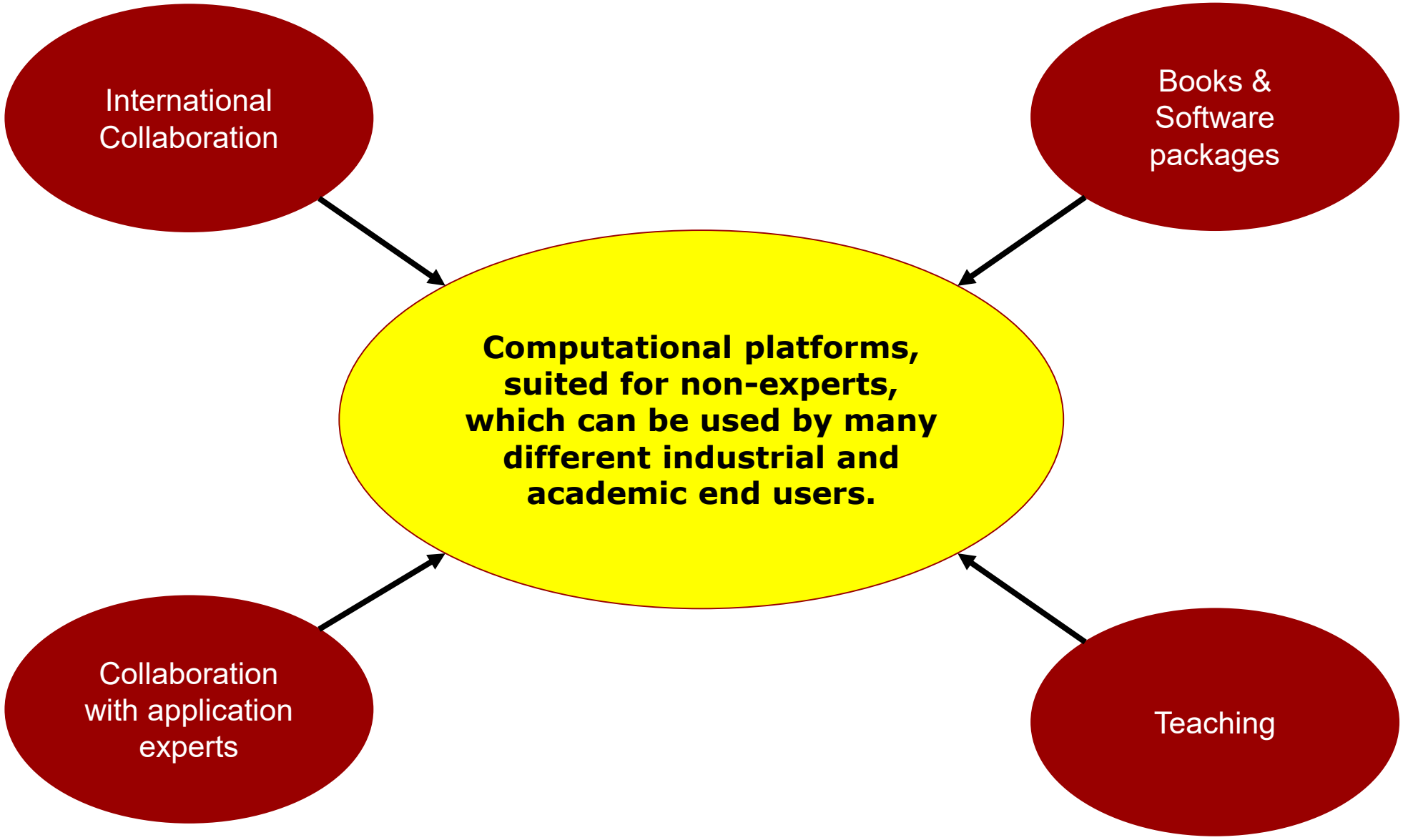
Publication







- **Matlab Software for Regularization of Discrete Ill-Posed Problems**
  - AIR Tools II - algebraic iterative reconstruction methods
  - IR Tools is a Matlab package of Iterative Regularization methods
  - Regularization Tools analysis and solution of discrete ill-posed problems. mxTV Total Variation image reconstruction.
  - TVReg 3D tomography using Total Variation regularization.
- **Matlab Software for Rank-Deficient Problems**
  - UTV Tools rank-revealing decompositions,
  - UTV Expansion Pack,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