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Workshop on Accurate Eigensolving and Applications

By Beresford Parlett

How can you tell a workshop from a regular meeting? Overhead projectors usually dominate regular meetings. At workshops, speakers are more likely to make use of the blackboard, all talks are peppered with questions from senior researchers, and graduate students often acquire the habit of interrupting. With these thoughts in mind, a small group of specialists gathered at the International Workshop on Accurate Eigensolving and Applications in Split, Croatia, July 12-16, 1996. Their goal was to share their knowledge of methods for solving the problem $Ax = \lambda Bx$ (or its singular value pendant) to as much accuracy as the data warrant. In particular, the need exists to describe the structure of matrices A , B , which determines their small eigenvalues (the ones of interest in most, but not all applications) to high relative accuracy. For example, consider the stiffness and mass matrices, usually called K , M , obtained by finite difference approximation. For one-dimensional problems the unassembled form NDN^t does determine the eigensolution $(NDN^t - \lambda M)v = 0$ to high relative accuracy, but more general finite element models, especially those in high dimensions, are still undecided. While it is known that factorizations like QR may essentially improve the computed accuracy of the singular values, we have now learned that the same is true of completely pivotal LU—a deeply non-unitary process. The highly accurate singular values of a bidiagonal were also shown to tune the subsequent inverse iterations so as to keep both their high speed and the necessary orthogonality. Workshop organizers Jesse Barlow, Ivan Slapničar, and Krešimir Veselić had though hard about the format of the meeting. The participants fell into two groups: about ten senior researchers actively working on these problems (Demmel, Drmač, Hari, Ipsen, Parlett, Ruhe, and the organizers) and about 15 graduate students, who are writing dissertations in this area. All participants stayed in one of the student dormitories at the University of Split, the formal host of the workshop. After breakfast each day a small caravan of cars made its way to the Department of Mechanical Engineering, Electrical Engineering, and Naval Architecture. Following three one-hour talks in the morning and at most one afternoon session, attendees had time for group discussions on open problems, software, and the publication of a possible monograph. Although there were only 15 talks in four working days, participants agreed that they needed the remaining time for informal technical work (A list of talks and abstracts can be found on the Web at <http://www.fesb.hr/slap/workshop>.)

The local organizer, Ivan Slapničar, had arranged an impressive program of entertainment, including among other events a guided tour of Diocletian's palace (from which the city grew in the 5th century). A full day on the wonderful Zlatni Rat Beach on the island of Brač, and an open air performance of Verdi's Nabucco. At the end of the workshop, Jesse Barlow announced that a follow-up meeting will be held in two years at Pennsylvania State University.

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