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The Probability That a Numerical, Analysis Problem Is Difficult (Classic Reprint)

By James W Demmel

Forgotten Books, United States, 2015. Paperback. Book Condition: New. 229 x 152 mm. Language: English . Brand New Book ***** Print on Demand *****.Excerpt from The Probability That a Numerical, Analysis Problem Is Difficult Numerous problems in numerical analysis, including matrix inversion, eigenvalue calculations and polynomial zero finding, share the following property: the difficulty of solving a given problem is large when the distance from that problem to the nearest ill-posed one is small. For example, the closer a matrix is to the set of noninvertible matrices, the larger its condition number with respect to inversion. We show that the sets of ill-posed problems for matrix inversion, eigenproblems, and polynomial zero finding all have a common algebraic and geometric structure which lets us compute the probability distribution of the distance from a random problem to the set. From this probability distribution we derive, for example, the distribution of the condition number of a random matrix. We examine the relevance of this theory to the analysis and construction of numerical algorithms destined to be run in finite precision arithmetic. To investigate the probability that a numerical analysis problem is difficult, we need to do three things: 1) Choose a measure of...



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