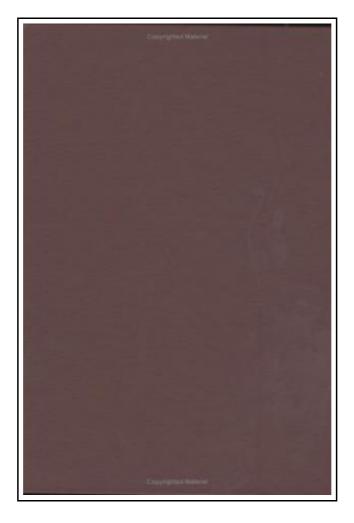# Oscillation Matrices and Kernels and Small Vibrations of Mechanical Systems (Revised edition)

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Reviews

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(Lorenz Vandervort)

OSCILLATION MATRICES AND KERNELS AND SMALL VIBRATIONS OF MECHANICAL SYSTEMS (REVISED EDITION)

American Mathematical Society. Hardback. Book Condition: new. BRAND NEW, Oscillation Matrices and Kernels and Small Vibrations of Mechanical Systems (Revised edition), F.P. Gantmacher, M. G. Krein, Fifty years after the original Russian Edition, this classic work is finally available in English for the general mathematical audience. This book lays the foundation of what later became 'Krein's Theory of String'. The original ideas stemming from mechanical considerations are developed with exceptional clarity. A unique feature is that it can be read profitably by both research mathematicians and engineers. The authors study in depth small oscillations of one-dimensional continua with a finite or infinite number of degrees of freedom. They single out an algebraic property responsible for the qualitative behavior of eigenvalues and eigenfunctions of one-dimensional continua and introduce a subclass of totally positive matrices, which they call oscillatory matrices, as well as their infinite-dimensional generalization and oscillatory kernels.Totally positive matrices play an important role in several areas of modern mathematics, but this book is the only source that explains their simple and intuitively appealing relation to mechanics. There are two supplements contained in the book, 'A Method of Approximate Calculation of Eigenvalues and Eigenvectors of an Oscillatory Matrix', and Krein's famous paper which laid the groundwork for the broad research area of the inverse spectral problem: 'On a Remarkable Problem for a String with Beads and Continued Fractions of Stieltjes'.The exposition is self-contained. The first chapter presents all necessary results (with proofs) on the theory of matrices which are not included in a standard linear algebra course. The only prerequisite in addition to standard linear algebra is the theory of linear integral equations used in Chapter 5. The book is suitable for graduate students, research mathematicians and engineers interested in ordinary differential equations, integral equations, and their applications.

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