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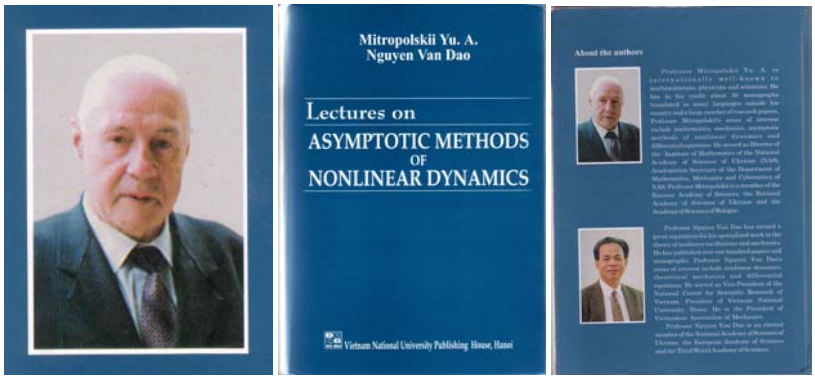
LECTURES ON ASYMPTOTIC METHODS OF NONLINEAR DYNAMICS

by

Mitropolskii Yu. A. and Nguyen Van Dao, (2003),
Vietnam National University Publishing House, Hanoi, p. 494.



This book grew out from the authors experiences as teachers and scientists in nonlinear dynamics and is aimed at newcomers to asymptotic methods of nonlinear dynamics, especially graduate students in mathematics, mechanics and physics.

Authors' goal is to explain the mathematics as clearly as possible and to show how the asymptotic methods can be used to understand the wonders of the nonlinear world. The essential prerequisite is calculus and differential equations. Numerous examples and problems are used to illustrate theorems and concepts. The material presented in this monograph, and most of the problems, require only minimal mathematical knowledge beyond elementary calculus are suitable for senior undergraduate and postgraduate students.

The book consists of four sections. First Section deals with the introductory lectures, including nonlinear oscillating systems, Poincare's, Lindested's and Liapunov's methods. Second Section is concerned with asymptotic method Krilov-Bogolyubov and Mitopolskii for both autonomous and non-autonomous systems and their applications in studying the oscillating systems with slowly varying parameters, systems with delay and deviated argument and the relaxation oscillatory systems etc. The next section is devoted to the averaging method of Bogoliubov and its mathematical foundation, the averaging method for stochastic systems, and the connection of the averaging method with stroboscopic method and the method of multiple scales. Fourth Section presents the interaction of nonlinear oscillations, between forced and self oscillations, between external and parametric excitations and between parametric excitation and self oscillations.

The symbols employed in the text are largely conventional.

The first author academician *Yuriy Alekseevich Mitropolskii* is internationally well known to mathematicians, physicists and scientists. He has to his credit about 50 monographs translated in many languages.

Yuriy Alekseevich Mitropolyskii is a famous soviet scientist, academician and specialist in the areas of mathematical physics, theory of nonlinear vibrations and differential equations. He is academician of the Ukrainian National Academy of Sciences, the academician of the Russian Academy of Sciences and of the Academy of Sciences of Bologne. Also, he was the Chairman of the Scientific Committees of the series ICNO scientific conferences. Yuriy Alekseevich Mitropolyskii was born on January 3rd 1917 in Schischaki, Gogolyevskiy reyon Poltavia's canton. By 1932 he had finished a seven-years school and began difficult working life. During the period 1932-1936 he worked in Kiev's cannery. In 1936 Yuriy Alekseevich Mitropolyskiy continued Kiev's 70th school, through 9th class, finishing it in 1938 with excellent grades. There are over the 150 articles, books and other publications concerning the life and work of Mitropolyskiy. Yuriy Alekseevich Mitropolyskii is the author of over 560 scientific articles, papers, scientific books, monographs and other scientific and popular publications. His scientific monographs were translated into many languages. Yuriy Alekseevich Mitropolyskii has been the organizer and the member of scientific committees of many international scientific congresses and conferences in the area of Nonlinear Mechanics and member of editorial boards of many international journals in area of the Nonlinear Mechanics. Yuriy Alekseevich Mitropolyskii was the supervisor of over 500 candidate theses, and of over 80 doctoral theses.

Research areas and the famous results: *Nonlinear Mechanics. Nonlinear Vibrations. Developments of Asyptotic Methods. Systems with slowly changing parameters. Nonstationary Precesses in Non-Linear Oscillatory Systems. Averaging Method in Non-linear Mechanics. Method of Integral manifolds. Systems with continuous parameters. Systems with delay. Accelerations of convergence. Random oscillations processes. Method of Decomposition.*

Visiting professor: (1958) University of Warsaw, University of Krakow, Gdansk's University; (1961) University of Baltimore, University Berkley, (1965), University of Karl - Praha, (1983) University of Nis etc.

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Yu.A. Mitropolyskii, A.K. Lopatin, Non-linear Mechanics, Groups and Symmetry, Institute of Mathematics, Ukraine, Kiev, 1995.

The second author of this monograph is Professor Nguyen Van Dao. He has earned a great reputation for his specialized work in the theory of nonlinear oscillations and mechanics. He has published over one hundred papers and some monographs. Professor Nguyen Van Dao's areas of interest include nonlinear dynamics, theoretical mechanics and differential equations. He server as Vice-President of the National Center for scientific Research of Vietnam, President of Vietnam National University, Haoi. He is the President of the Vietnamese Association of Mechanics.

Professor Nguyen Van Dao is an elected member of the National Academy of Sciences of Ukraine, the European Academy of Sciences and the Third World Academy of Sciences.