



Advances in the Linear Dynamic Systems Theory

By Lyubomir Gruyitch

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The discovery of the full transfer function matrix $F(s)$ of the linear dynamic system eliminates the deep and essential lacuna of their existing theory. It describes in the complex domain how the system simultaneously transmits and transfers both the action of the input vector and the influence of all initial conditions on system output behavior. It has exactly the same properties as the classical system transfer function matrix $G(s)$ that is valid only under all zero initial conditions. The full transfer function matrix is determined (together with all its submatrices) for the three classes of the systems. Since Lyapunov stability properties are defined for nonzero initial conditions, their tests should be carried out by using $F(s)$ because the use of $G(s)$ can give the result opposite to the correct one, i.e. the result via $G(s)$ can be that the system is stable despite it being unstable. The test via $F(s)$ overcomes this problem. BIBO stability is defined for zero initial conditions in order to test it effectively by using $G(s)$. Initial conditions are almost always different from zero. By allowing non-zero initial conditions, various new stability properties under bounded-input and for bounded arbitrary initial conditions are defined. Their tests should be carried out by using $F(s)$. $G(s)$ is inapplicable. For Lyapunov stability properties, bounded-input, and nonzero bounded initial conditions, new stability criteria proved in the book are in terms of $F(s)$. Advances in the Linear Dynamic Systems Theory establishes the new system fundamental in the complex domain. It is inherent for system stabilization and/or optimization. The book is equally significant and useful for lecturers, students, and researchers as for linear dynamic system designers.

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Editorial Review

About the Author

Until his retirement, Lyubomir Gruyitch, Dipl. Eng., M. Sci., D. Sci., was Professor or Visiting Professor of Control and Dynamic Systems in France, Republic of South Africa, Serbia, and the USA. He has published six books, four textbooks, eleven lecture notes (in English, French and Serb), one manual of solved problems, one book translated from Russian, chapters in eight scientific books, 127 scientific papers in scientific journals, 170 conference research papers, and two educational papers.

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