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	Nota di contenuto	Introduction to the Stability of Time-Delay Systems -- Introduction to Analytic Curves -- Analytic Curve Perspective for Time-Delay Systems -- Computing Puiseux Series for a Critical Pair -- Invariance Property: A Unique Idea for Complete Stability Analysis -- Invariance Property for Critical Imaginary Roots (CIRs) with Index g = 1 -- Invariance Property for Critical Imaginary Roots with Index n = 1 -- Invariance Conjecture and Frequency-Sweeping Framework -- Complex Stability for Time-Delay Systems: A Unified Approach -- Extension to Neutral Time-Delay Systems -- Concluding Remarks and Further Perspectives.
	Sommario/riassunto	In this brief the authors establish a new frequency-sweeping framework to solve the complete stability problem for time-delay systems with commensurate delays. The text describes an analytic curve perspective which allows a deeper understanding of spectral

properties focusing on the asymptotic behavior of the characteristic roots located on the imaginary axis as well as on properties invariant with respect to the delay parameters. This asymptotic behavior is shown to be related by another novel concept, the dual Puiseux series which helps make frequency-sweeping curves useful in the study of general time-delay systems. The comparison of Puiseux and dual Puiseux series leads to three important results: an explicit function of the number of unstable roots simplifying analysis and design of time-delay systems so that to some degree they may be dealt with as finite-dimensional systems; categorization of all time-delay systems into three types according to their ultimate stability properties; and a simple frequency-sweeping criterion allowing asymptotic behavior analysis of critical imaginary roots for all positive critical delays by observation. Academic researchers and graduate students interested in time-delay systems and practitioners working in a variety of fields – engineering, economics and the life sciences involving transfer of materials, energy or information which are inherently non-instantaneous, will find the results presented here useful in tackling some of the complicated problems posed by delays.