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| Nota di contenuto | On Traffic Modeling -- Delays in Traffic-Flow Models -- Stability Analysis Framework of Delay Systems -- Linear Stability of Traffic Flow Models with Discrete Delays -- Linear Stability of Traffic-Flow Models with Distributed Delays -- Slinky Effects with Discrete and Distributed Delays -- Conclusions and Future Directions. |
| Sommario/riassunto | This book is a study of the effects of delays, stemming from a range of sources, on the behaviour of traffic flow. It provides the reader with theoretical approaches and computational tools, including existing tools from the field of control systems, for analysing the stability and slinky features of dynamical systems affected by time delays. Through examples and case-studies it shows how to implement these tools on a variety of traffic-flow models. The models considered are microscopic flow models (dealing with the behaviour of individual vehicles rather than the study of group effects) formulated as continuous-time deterministic delay-differential equations. Physiological lag (human reaction), mechanical time-lag and the delay time of vehicular motion are only a few examples of the multitude of delays that are applied to a traffic model. Such delays may also be discrete (constant), distributed |

or time-varying; the text concentrates on the constant and distributed delays associated with the representation of linear stability and slinky features to allow a compact and analytically tractable demonstration of the intricacy of delay effects. Readers with an academic research background in applied maths, vehicle dynamics and traffic modelling and graduate students working in those fields will find this brief to be an interesting source of results and openings for further work. It is also useful for engineers working on traffic-management systems and the guidance and control of autonomous vehicles.