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Sommario/riassunto	The objective of this brief is to carefully illustrate a procedure of applying linear parameter-varying (LPV) control to a class of dynamic systems via a systematic synthesis of gain-scheduling controllers with guaranteed stability and performance. The existing LPV control theories rely on the use of either H-infinity or H2 norm to specify the performance of the LPV system. The challenge that arises with LPV control for engineers is twofold. First, there is no systematic procedure for applying existing LPV control system theory to solve practical engineering problems from modeling to control design. Second, there exists no LPV control synthesis theory to design LPV controllers with hard constraints. For example, physical systems usually have hard constraints on their required performance outputs along with their sensors and actuators. Furthermore, the H-infinity and H2 performance criteria cannot provide hard constraints on system outputs. As a result, engineers in industry could find it difficult to utilize the current LPV methods in practical applications. To address these challenges, gain-

scheduling control with engineering applications is covered in detail, including the LPV modeling, the control problem formulation, and the LPV system performance specification. In addition, a new performance specification is considered which is capable of providing LPV control design with hard constraints on system outputs. The LPV design and control synthesis procedures in this brief are illustrated through an engine air-to-fuel ratio control system, an engine variable valve timing control system, and an LPV control design example with hard constraints. After reading this brief, the reader will be able to apply a collection of LPV control synthesis techniques to design gain-scheduling controllers for their own engineering applications. This brief provides detailed step-by-step LPV modeling and control design strategies along with a new performance specification so that engineers can apply state-of-the-art LPV control synthesis to solve their own engineering problems. In addition, this brief should serve as a bridge between the H-infinity and H2 control theory and the real-world application of gain-scheduling control.