

OUTPUT TRACKING OF NONLINEAR FEEDBACK SYSTEMS WITH PERTURBATION BASED ON ROBUST RIGHT COPRIME FACTORIZATION

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ABSTRACT. This paper considers a tracking problem of nonlinear feedback control systems with perturbations based on robust right coprime factorization. The proposed universal design scheme on the nonlinear control system can not only guarantee the robust stability of the perturbed systems but also realize the output tracking to the reference input. And the effectiveness of the proposed method is confirmed by simulations.

Keywords: Output tracking, Right coprime factorization, Perturbation, Bezout identity

1. Introduction. The control design problems of the linear systems have got a considerable and comprehensive progress in the last century [6]. At the same time, the nonlinear control design systems have shown a slower progress. Many researchers entered the field of nonlinear control systems and have achieved remarkable results. However, the effect of the nonlinear control systems is far from profundity. One of the main reasons is the practical and effective methods in the linear control systems could not be directly applied into the nonlinear control systems owing to their complex structures and the nonlinear characteristics. For the nonlinear control systems, there are many problems available for further considering and studies. And among them, the robust issues play an important role. And it has been attracting more and more attention from the researchers almost in every fields of the control design systems [1-3,8]. Besides the robustness of the systems, the output tracking problem is also one of the significant problems on the nonlinear systems.

Since 1980s, the coprime factorization method has been proposed to deal with the robust issues on the nonlinear control systems. Thanks to the great endeavors and contributions of many researchers, the coprime factorization method has been a promising method for the control problems of the nonlinear feedback control systems.

The approach of coprime factorization supplies us a convenient framework for researching the input-output stability properties of a nonlinear feedback control system, where the given plant is usually unstable. Many researchers applied and developed methods from various aspects and various fields. The Youla-Kucera parameterization and left coprime factorization for the nonlinear systems were considered in [8,9]. The robust right coprime factorization and robust stabilization for nonlinear feedback control systems were studied in [1] and the authors gave a condition to guarantee the overall stability for the right coprime factorization under the assumption that the control system is well-posed. The initial conditions of nonlinear systems and a new definition named dynamic right coprime factorization were proposed in [7]. However, the two papers [1,7] didn't consider