

ABSTRACT

FERREIRA, Wallace Ribeiro. *Extremum Seeking and Sliding Mode Control Applied to Anti-lock Braking Systems*. 54 f. Dissertação (Mestrado em Engenharia Eletrônica) - Faculdade de Engenharia, Universidade do Estado do Rio de Janeiro (UERJ), Rio de Janeiro, 2021.

ABS is a important anti-lock braking system widely used in a variety of automotive applications. Its operation consists in controlling the wheel slip, thus preventing the wheels from locking up during braking, maximizing the braking force and shortening the braking distance while maintaining maneuverability. The nonlinear nature of the road-tire interaction as well as the uncertainties related to each particular road condition make this a challenging problem. In this work, a new design is proposed to control the wheel slip. An Extremum Seeking Controller is designed to estimate the optimum slip value to each road condition in real time, and a Sliding Mode Controller is employed to regulate the desired slip value. The stability analysis of the closed-loop system is presented. Numerical simulations show a good performance of the proposed control strategy.

Keywords: Anti-lock Braking System , Extremum Seeking, Sliding Mode Control, Slip Regulation, Control System.