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MATHEMATICAL MODEL FOR ATTITUDE CONTROL OF SMALL SATELLITES USING ROTATION ANGLES

Abstract

The paper purpose is to present some aspects regarding the calculus model and technical solutions for small satellites attitude control. Mathematical model is put in nonlinear and linear form. The linear form obtained is use for attitude control system synthesis. The attitude control system obtained is used in nonlinear in order to maintain desired attitude. A few numerical simulations are made for standard input and satellite behavior is obtained. The satellite model presented will be with six degrees of freedom (DOF) and use Cartesian coordinates. As novelty of the work we will use the rotation angles for describe the kinematic equations. To highlight the advantage of these parameters kinematic equations will be described also by using Euler's angles, and Hamilton's quaternion. The paper proposes a Fourier linearising of Trigger Schmidt element used for applying the command moment. The results analyzed will be the rotation angles of the satellite as well the rotation velocity. The conclusions will focus to comparison between results obtained using different attitude control system, and the possibility to use such system for small satellite.