

Modelling and Simulation of EIRSAT-1 Attitude Determination and Control System

J. Thompson, D. Sherwin, V. Ubeda, W. O'Connor

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1 Introduction

This document details initial modelling and simulation of the Attitude determination and Control System (ADCS) for EIRSAT-1. This includes a background theory section, details of the simulation environment and a number of simulation results representing different control modes and different mission profiles.

2 Theory

2.1 Co-ordinate systems and Reference Frames

2.2 Satellite Dynamics

2.3 Orbital Dynamics

2.4 Environment

2.4.1 Magnetic Field

2.4.2 Gravitational Field

2.5 Sensor Models

2.6 Actuator Models

3 Simulation Environment

Simulink Model Structure

3.1 Dynamics block

3.2 Environment block

3.3 Sensor block

3.4 Actuator block

3.5 Controller block

3.6 Reference block

3.7 Mode Select block

4 Running Simulations

4.1 Model Setup File

4.2 Simulation Setup File