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TEMPERATURE PREDICTION FIRST RESULTS OF A SOLAR POWER GENERATOR BASED ON
THE SPS-ALPHA CONCEPT

Abstract

Space Based Solar Power (SBSP) is gaining more interest since the last few years. The different subsystems were demonstrated technically, and no technical breakthrough is required to realize SBSP. However, research and development are required to scale up the demonstrated subsystems, which will lead to a full economical assessment. This paper is part of a PhD thesis aiming to build a technology demonstration for a thermal management system for the Solar Power Generator (SPG) based on the SPS – ALPHA concept at the University of Strathclyde the Mechanical and Aerospace Engineering department. The PhD study will also assess the system level performance implying the designed thermal management system. The first step is to predict the temperature and the required heat to be rejected given the design, orbital and operational conditions of the SPS-ALPHA. The paper presents the first results of the steady and the transient solution of the heat equations modeling the Solar Power Generator. The steady state solution was solved analytically, but the transient solution required a numerical method. The methodology of the solution will also be discussed. Finally, the methodology of the sensitivity study that assesses the system level performance will be described.