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MODELING A LIFE SUPPORT SYSTEM FOR GROWING PLANTS ON MARS FOR OXYGEN
PRODUCTION AND GAS FLOW CONTROL

Abstract

Since the interest of many space stations into going to Mars is growing, new ways of oxygen generation and storage must be studied. The conditions and composition of the atmosphere of Mars don't facilitate the resources to obtain this gas. Thus, it will be necessary to produce oxygen for the humans living on the Martian base. The oxygen generation on Earth is based on the photosynthesis; plants consume carbon dioxide, water and light energy to produce glucose and oxygen, where the oxygen is managed as a waste. In a Mars space station, as long as the oxygen is needed for human respiration, a controlled environment of plants can be a good option for the gas interchange. As for any other research, economic funds are needed. Nonetheless, computational simulation is a great option before testing a real prototype of a plant-based life support systems. This research is focused on presenting a computational model and simulation of the flow of gases involved in the photosynthesis process as an economically accessible alternative of investigation. The software SolidWorks and its extension Flow Simulation, will be used to test prototypes designed with different materials, geometric distribution, mass flow of the gases and environmental conditions. The data obtained will be used to determinate if this method of gaseous interchange will be enough or even valid to use as part of human life support systems in a Martian space station.