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TOWARDS AN INTERPLANETARY SPACESHIP: A STUDY ON INTERPLANETARY AND DEEP SPACE EXPLORATION

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• INTRODUCTION

Interplanetary and deep space exploration have long been a keen interest for numerous scientists, explorers, and curious minds around the world. The exploration of these unknown territories aims to unravel the mysteries of our universe and also to investigate the potential for extraterrestrial life and at the same time helps us to understand the fundamental scientific principles. This paper offers a comprehensive overview of this captivating topic.

• MATERIALS AND METHODOLOGY

Several scientific instruments such as cameras, spectrometers, etc are designed to collect data and perform experiments in space. Also the spacecrafts and it's equipments are to be lightweight but also durable. Hence, construction of materials such as composites, aluminium and etc plays a vital role.

Deep space missions involve extensive planning and strategizing, such as selecting a target Celestial body, carefully planning the mission trajectory and etc. Spacecrafts are launched into space using various launch vehicles like rockets. Hence, the trajectory is carefully calculated to achieve the desired destination and optimize the mission.

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Case study on Nuclear Thermal Propulsion Reactor

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1. INTRODUCTION

Since the beginning of human civilization, Humans are always attracted toward the sky. The curiosity to know the world beyond the site is always been a dream to us. Many attempts took place few we succeeded and few others failed but the fantasy of human to go to space remained. Then the greatest leaping achievement happened THE APOLLO 11 lunar module at 02:56 GMT on 21 July 1969, American astronaut Neil Armstrong became the first person to walk on the Moon. He stepped out of the Apollo 11 lunar module and stepped onto the Moon's surface, in an area called the 'Sea of Tranquility.

The real race between the nations began, all started in space advancement numerous space craft was built numerous satellites were built and the amazing space stations were built and Rakesh Sharma became one and only Indian till today to go to space as an Indian citizen. He was sent into space on the Russian spaceflight Soyuz T-11 in April 1984.The major thing that remained as the problem till date is fuel for the propulsion. And the best solution ever thought is NUCLEAR THERMAL ROCKET PROPULSION SYSTEMS

Most rockets are thermally driven gas devices in which energy is added in the form of heat. This heat energy ejects propellant from the engine, giving us the required momentum exchange or thrust. Energy can come from any number of sources. In chemical propulsion, the propellant releases energy

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Chapter

Assessment of Solar Dryer Performance for Drying Different Food Materials: A Comprehensive Review

Guna Muthuvairavan, Saranya Manikandan, Elavarasan Elangovan and Sendhil Kumar Natarajan

Abstract

Studying crucial drying parameters, such as activation energy and moisture diffusivity, offers valuable insights for optimizing food safety. Accurate predictions and simulations through mathematical thin-layer models aid in designing, controlling, and optimizing drying operations for various food items. Solar drying presents a viable and eco-friendly solution for food preservation. This chapter critically evaluates solar drying performance for various vegetables, fruits, marine products, and other commodities, providing comprehensive insights into its efficiency. According to the literature, the moisture diffusivity (m^2/s) for vegetables has been reported to be within the range of 2.01×10^{-10}–1.935×10^{-8}. For fruits, the moisture diffusivity varies between 1.33×10^{-10} and 6.98×10^{-9}. In the case of marine food products, the range is found to be 2.8×10^{-8}–3.408×10^{-7}, while for other commodities, it falls between 1.79×10^{-9} and 1.061×10^{-7}. The activation energy (kJ/mol) for vegetables has been observed to fall within the range of 24.81–47.19. Similarly, for fruits, the activation energy varies between 2.56 and 45.20. Notably, Ginger demonstrates an activation energy of 35.675 kJ/mol. Experimental results showed that lower activation energy and higher moisture diffusivity accelerate dehydration.

Keywords: solar drying, natural convection, forced convection, moisture diffusivity, activation energy, mathematical modeling

1. Introduction

Meeting the food demands of a rapidly rising global population is a significant concern for civilization. By 2050, the world's population is expected to reach 9.1 billion, demanding an additional 70% of the food supply. Most of this population expansion is likely attributed to emerging countries, with many currently suffering