

From Earth Missions to Deep Space Exploration (05)
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Author: Mr. Gurunadh Velidi
University of Petroleum and Energy Studies, India, guru.velidi@live.in

Mr. Seetesh Pande
Individual collaboration, India, seetesh.pande@gmail.com

Dr. Ugur Guven
United States, drguven@live.com

Mr. Samaksh Behl
University of Petroleum and Energy Studies, India, samaksh.behl@gmail.com

Ms. Yachna Gola
University of Petroleum and Energy Studies, India, yachna.2289@gmail.com

ALPHA-CENTAURI MISSION DESIGN USING INTERSTELLAR FLIGHT: TECHNOLOGICAL
POSSIBILITIES AND ITS LIMITATIONS

Abstract

In deep space exploration, objectives of mankind are to reach nearest star to study its environment. In the galaxy, the nearest star to the solar system is Alpha Centauri with 4.35 light years distance. This paper addresses the possibilities in reaching Alpha Centauri and limitations in designing such an Interstellar mission. Since the distances are very high, it is impossible to accomplish with the chemical propulsion systems due to the limitations of speed and fuel. Nuclear Propulsion will be a technological feasibility to reach Alpha Centauri in the maximum possible speed. In the course of design, unmanned interstellar flight using nuclear rocket propulsion with the reduced radiation effects will be an interesting aspect of this particular mission. Gas core reactors that will be operated with the hydrogen propellant and uranium hexafluoride will be designed as per the trust required to reach the distance with the consideration of both acceleration and the deceleration in the mission. Since we are limited with the information regarding the environment of Alpha Centauri, it will be difficult to design manned mission in the initial stages. What kind of planets and other celestial bodies exist in the peripherals of the star system will be a great invention the robotic mission and this will set a path to the future deep space mission designs. Also we have to concentrate about the control functions and the reliability of the mission besides the propulsion system design. In the prop control point of view due to the long distance it is highly impossible to control from the earth, under these conditions the probe should be able to think on its own. Hence, a probed mission to Alpha Centauri has to be designed with Artificial Intelligence protocols in such a way that the probe will be able to accomplish the mission without any unexpected problems. Then, this can pave the way for a manned mission to Alpha Centauri which can take place sometime toward the end of the 21st century. In this paper, we will discuss both the manned and the unmanned prospects for an interstellar mission to Alpha Centauri using advanced nuclear propulsion means. Specifically, gas core reactors will be considered due to high level of specific impulses which can be attained. It is the purpose of this paper to prove that interstellar flight is within the means of today's technology.