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Gas core nuclear rocket engine for interstellar space travel

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Gas core nuclear rocket is a prodigious concept which helps in human exploration throughout the solar system and beyond because of high specific impulse ($\sim 3000\text{sec} - 5000\text{sec}$) and high thrust ($\sim 44200\text{lb}$). A gas core nuclear rocket uses nuclear fuel in a gaseous state instead of liquid or solid. It will be the most effective rocket when compared to the other conventional rockets. As in the propulsion system higher the temperature results in higher specific impulse which is possible with this concept. The whole process is confined in a pressure shell to confront the cavity pressure. Here the propellant such as hydrogen is heated by the radiation emitted from the fissioning process of the uranium fuel and the heated hydrogen escapes through the nozzle to produce thrust. At high temperature hydrogen becomes transparent to this radiation, so seeding technique is used by providing additional seeding material to make it opaque which in turns also preserves the walls. Moderator is introduced inside the pressure shell to moderate or thermalize the neutrons which are coming from fuel region. Excess amount of heat is absorbed by the cooling agents which are present in the pressure shell. Having complexities such as fuel loss along with propellant, higher working temperature is limited by its component's lowest melting temperature & maintaining the gaseous plasma ball. In order to overcome these complexities many ideas can be set down to make it real time.

Biography

Ms. Sagarika Chikhale completed her bachelors in Electronics and Instrumentation Engineering at the age of 21 from R.G.P.V University and pursuing masters in Aerospace Engineering from Sapeinza University of Rome, Italy.

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