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A NOVEL SPACECRAFT PROPULSION DESIGN USING IONIZED MICROPLASTICS

Abstract

Accumulation of the small-sized and long-living microplastics in our environment is of paramount concern for our planet's future. These microplastics that pose detrimental effects to ocean life and consequently to human beings must require an alternate disposal solution. The main motivation behind this proposal is to put the waste produced on earth to productive use. One of the main issues surrounding any conventional electric propulsion engine is that of minimal thrust. This is due to the low fuel-mass being spent and not the exhaust velocity of the same. A model involving the usage of microplastics as an alternate to the conventional thrusting fuels is proposed and discussed. Microplastics of Polypropylene are used in this model with further combination of accelerants such as Carbon Monoxide Carbonyl for their ultraviolet degradation after being spent. An additional advantage of using microplastic particles includes the decent amount of thrust generated as a result of the fuel-mass dispensed in the process. The design of this model is structured following the standard model for Pulsed Plasma Thrusters and modified with a narrow corridor for the microplastics to cruise through followed by a conduit of heated plasma thus emerging ionized. The tiny microplastic entities when used in this design do not have to undergo any ablation unlike the conventionally used Teflon and hence can minimize the power and components involved. Consequently, this elimination of ablation resolves the issue of carbon deposition in the interiors of the engine. This paper proposes one such alternative which can simultaneously enhance spacecraft propulsion techniques and it includes the complete engine design and specific impulse calculations supported by required simulation results. These engines are proposed in light of delivering the thrust required for attitude control, orbital corrections and deorbiting of spacecrafts.