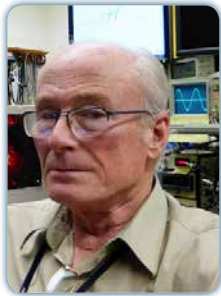


5th International Conference and Exhibition on

MECHANICAL & AEROSPACE ENGINEERING

October 02-04, 2017 Las Vegas, USA



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Recent developments in advanced propulsion and the issues of interstellar transport

Advanced propulsion is often taken to encompass all propulsion schemes more advanced than chemical rockets. Really advanced propulsion, however, is that enabling interstellar travel in short times, and that demands wormholes and/or warp bubbles. The stepping stone to such schemes is often figuring out how to accelerate a vessel without ejecting large amounts of propellant – so-called field propulsion. These schemes – wormholes, warp drives, and field propulsion – all involve gravity “manipulation”, whereas all other advanced propulsion schemes do not. In this talk I will recount some of the activities known to me of the collection of people working on gravity manipulation in the past several years. It is a tale of trial and error. But tangible results indicate that gravity manipulation may in fact be achievable, making propellant less realistic. Realistic interstellar transport demands more than propellant less propulsion, as Kip Thorne and several graduate students showed in their work on wormhole physics in 1988. Six years later, Miguel Alcubierre constructed the “warp drive” “metric” of general relativity that shows what is needed to zip around spacetime, seemingly at speeds faster than the speed of light. The requirement for both wormholes and warp drives is a Jupiter mass of negative rest mass (“exotic”) matter. Before Thorne did his work, a small collection of people worked on schemes to make lightspeed (and faster) travel possible. And after Thorne and Alcubierre, that collection of people has worked toward the goal of realizing the conditions dictated by general relativity for “hyperspeed” travel, be it through wormholes or encased in warp bubbles. We will look at whether such schemes are possible.

Biography

James F Woodward has completed a PhD in history (of science) at the University of Denver in 1972 after obtaining Bachelor's and Master's degrees in Physics at Middlebury College and New York University in the 1960s. Retired in 2005, he is emeritus Professor of History and Adjunct Professor of Physics at California State University Fullerton where he continues to do experimental work on advanced propulsion and the enigmatic sciences (gravity manipulation). Noting that inertia in general relativity is a gravitational phenomenon where local objects are seemingly instantaneously coupled to distant matter in the universe, he has elaborated a way that transient phenomena can be used to perform said manipulation. This, and other material related to this talk, can be found in his recent book: *Making Starships and Stargates: The Science of Interstellar Propulsion and Absurdly Benign Wormholes* published by Springer Verlag in 2013. His work is supported by the exotic propulsion initiative of the Space Studies Institute.

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