George Matsoukas et al., J Aeronaut Aerospace Eng 2014, 3:2
http://dx.doi.org/10.4172/2168-9792.S1.004

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Mechanical & Aerospace Engineering
September 08-10, 2014 Hilton Philadelphia Airport, USA

Experimental investigation of asymmetrical capacitors for electric propulsion

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Investigation into electric propulsion continues to be an area of hopeful research since the pioneering age of aviation. However, increased global awareness of carbon emissions on the planet and the desire to create more efficient systems have reinvigorated new life into the field. Experimental studies on electric propulsion by virtue of asymmetrical electrodes, on a micro scale, have yielded superior efficiency ratings as opposed to currently adopted methods. The observed effect is that asymmetrical electrodes which are subjected to high voltage and are separated by a dielectric material experience thrust towards the smaller electrode. This method of propulsion is unique and possesses several features that differentiate it from conventional methods of propulsion. One major benefit of this phenomenon is that the electrical energy is directly converted into a mechanical force without the requirement of any moving components. Such a method of propulsion is virtually propellant-less and would not require large fuel supplies or fuel payload which is currently one of the primary drawbacks of conventional rocket and jet propulsion. The implications of this include increased travel time, improved maneuverability and improved stealth characteristics. Craft of this essence would eliminate both acoustic and heat signatures due to the absence of exhaust heat and noise like conventional propulsion systems. Such characteristics make this system ideal for UAV type propulsion. To date, the characteristics of the thrust produced on the asymmetrical electrodes are not entirely understood. In the context of increasing the utilization of this technology, an experimental program at the University of New South Wales Aerodynamics Laboratory is under-way which investigates model asymmetrical electrodes charged with voltages ranging from 0-20 kV. The electrodes were surrounded by magnetic fields in various positions in order to increase the thrust and efficiency of the system. It is found that magnetic fields increase the thrust on the asymmetrical capacitor which is in favor of an ion wind explanation of this electric propulsion system.

Biography

George Matsoukas obtained his BE in Mechanical Engineering BA in Ancient History from the University of New South Wales. He is currently an active member of the research team engaged in various studies of aircraft performance enhancement and propulsion.

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