

SPACE PROPULSION SYMPOSIUM (C4)  
Electric Propulsion (4)

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## NANOPARTICLE ACCELERATOR WITH LORENTZ MODULATION-NAPALM

**Abstract**

The NAPALM project is a novel and revolutionary space propulsion principle, able to deliver a very high specific impulse through a new type of an electric thruster. The new thruster will far exceed, by between ten and sixty percent, the specific impulse in a vacuum of all existing electric and thermoelectric rocket engines. This will be accomplished through a new working medium, comprised of relatively high-mass nanoparticles that will be accelerated to very high kinetic energies. While all current electric thrusters are only able to deliver up to 15.000s specific impulse, the new thruster is expected to deliver between 18.000 and 30.000s optimal specific impulse. This extraordinary property will increase with the equal amount the deliverable ideal velocity during an interplanetary mission. This increased exit velocity conveys into a propellant saving of up to 60% for the same mission performance. An extra, efficient application of the new thruster with low thrust levels this time, is in the attitude control of spacecrafts and satellites, which will save large amounts of propellant, in comparison to the chemical attitude control units. Additionally, the NAPALM thruster is expected to deliver an absolute thrust of more than 0.1 Newton for every mass flow rate of 1 milligram/second and thus exceeding 2 Newtons of absolute vacuum thrust for the beginning. This thrust enhancement will allow for much higher accelerations during the powered flight and to a subsequent reduction of the duration of interplanetary missions. While the transfer duration from Earth to Mars is today, with the high thrust chemical propulsion, of between 5-7 months, and the VASIMR plasma thruster promises a reduction of the flight duration to 1.5 months, the present proposal is set to reduce this flight time by up to 65%. This very impressive performance will overwhelmingly surpass all existing or presently proposed electric propulsion systems. The new concept is initiated by Istvan Lorincz, a student at UPB and with INFLPR logistic support in Romania, and it is currently considered for sponsorship from a national grant in 2010.