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Laser ablation with applied magnetic field for electric propulsion[1]

ALLA BATISHCHEVA, DSL, Cambridge, MA, OLEG BATISHCHEV, NU, Boston, MA, JEAN-LUC CAMBIER, AFRL, Edwards AFB, CA — Using ultrafast lasers with tera-watt-level power allows efficient ablation and ionization of solid-density materials [1], creating dense and hot (∼100eV) plasma. We propose ablating small droplets in the magnetic nozzle configurations similar to mini-helicon plasma source [2]. Such approach may improve the momentum coupling compared to ablation of solid surfaces and facilitate plasma detachment. Results of 2D modeling of solid wire ablation in the applied magnetic field are presented and discussed.

[1] O. Batishchev et al, Ultrafast Laser Ablation for Space Propulsion, AIAA technical paper 2008-5294, -16p, 44th JPC, Hartford, 2008.
[2] O. Batishchev and J.L. Cambier, Experimental Study of the Mini-Helicon Thruster, Air Force Research Laboratory Report, AFRL-RZ-ED-TR-2009-0020, 2009.

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