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Characteristics of High-Density Helicon Plasma Sources and Their Application to Electrodeless Electric Propulsion[1] S. SHINOHARA, H. NISHIDA, T. NAKAMURA, A. MISHIO, H. ISHII, N. TESHIGAHARA, H. FUJITSUKA, S. WASEDA, TUAT, T. TANIKAWA, Tokai U., T. HADA, F. OTSUKA, Kyushu U., I. FUNAKI, T. MATSUOKA, JAXA, K. SHAMRAI, T. RUDENKO, INR — High-density but low temperature helicon plasmas have been proved to be very useful for fundamental research as well as for various applications. First, we introduce our very large helicon sources [1] with a diameter up to 74 cm. For the industrial and propulsion applications, we have reduced the aspect ratio (axial length-to-diameter) down to 0.075, and examined the discharge performance and wave characteristics. Then, we discuss our small helicon sources [1] for developing new electrodeless acceleration schemes. Some experimental and theoretical results [2] by applying the rotating magnetic (or electric) fields to the helicon plasma under the divergent magnetic field will be presented, along with other propulsion schemes. In addition, an initial plasma production experiment with very small diameter will be described.

[1] S. Shinohara *et al.*, Jpn. J. Appl. Phys. **35** (1996) 4503; Rev. Sci. Instrum. **75** (2004) 1941; Phys. Plasmas **16** (2009) 057104.
[2] S. Shinohara *et al.*, *32th Int. Electric Propul. Conf.*, IEPC-2011-056, 2011.

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