Table 1 Catalogued thrusters and their operating regimes.

Thruster	Principal Investigators	Power (kW)	B_A (T)	Propellants	p_b (mTorr)	Error Reported?	Electrode Geometry	Refs.
Alta	Albertoni et al.	21–230	0–0.1	Ar	0.15	Y	conical, dir.	[1–4]
H2-1	Cann et al.	38–89	0.1–0.3	H_2	150	N	conical, del.	[5]
H2-2 (D – F)	Cann et al.	4–14	0.2–0.7	H_2	20–40	N	cylindrical	[5]
H2-3B	Cann et al.	8–17	0.3	H_2	50	N	cylindrical	[5]
H2-4 (A – E)	Cann et al.	7–13	0.3	H_2	15–30	N	conical, del.	[5]
H2-4F	Cann et al.	4–13	0.3	H_2, He, N_2, Ar	0.05–70	N	conical, del.	[5]
HC-8	Fradkin and Roehling	14	0.2	Li	0.02	Y	cylindrical	[6, 7]
LAJ-AF (2 – 4)	Moore et al.	7–23	0.3–0.5	Li	0.7–1000	Y	cylindrical	[8]
LAJ-AF-6D	Cann et al.	3–34	0.2–0.5	Li, Na, K	0.5	Y/N	cylindrical	[5, 9, 10]
LAJ-BF-1D	Cann et al.	4–16	0.08–0.2	K	0.1	Y	cylindrical	[10]
LAJ-CF (3 – 5)	Moore et al.	6–38	0.5	Li	30–1000	Y	cylindrical	[8]
LaRC	Grossmann et al.	8–36	0.1–0.6	Ar	5	N	cylindrical	[11, 12]
LeRC-A0	Mantenieks, Myers, et al.	20–48	0–0.3	Ar	0.5	Y	conical, del.	[13–15]
LeRC-B0	Mantenieks, Myers, et al.	30–45	0.02–0.2	Ar	0.5	Y	conical, dir.	[13–15]

Thruster	Principal Investigators	Power (kW)	B_A (T)	Propellants	p_b (mTorr)	Error Reported?	Electrode Geometry	Refs.
LeRC-C0	Myers et al.	29–72	0.02–0.04	Ar	0.5	Y	cylindrical	[14, 15]
LeRC-A	Myers	15–87	0.03–0.2	H_2, Ar	0.5	Y	cylindrical	[16–19]
LeRC (B, C, E – G)	Myers	24–120	0.03–0.2	Ar	0.5	Y	cylindrical	[16–18, 20]
LeRC-H	Myers	38–59	0.03–0.1	Ar	0.5	Y	conical, dir.	[17, 18]
MAI-30kW	Kim et al.	12–38	0.06–0.1	Li	5	Y	conical, dir.	[21]
MAI-130kW	Tikhonov et al.	53–120	0.05–0.09	Li	4	Y	conical, dir.	[22–25]
MAI-200kW	Tikhonov et al.	120–180	0.05–0.3	Li	5	Y	conical, dir.	[26, 27]
MY-I	Tahara et al.	230–4,900	0–0.3	H_2, NH_3	0.008	Y	cylindrical	[28]
MY-III	Tahara et al.	98–4,900	0–0.5	H_2, NH_3, Ar	0.008	Y	conical, del.	[28–32]
MY-III (C1-1, C1-3, C1-3-CA.L, C1-3-CO.L, C2-12, C2-23, C3-123)	Tahara et al.	360–3,900	0.05–0.5	H_2, NH_3	0.008	Y	conical, del.	[28, 29]
NaU-A	Ichihara et al.	0.7–3	0.1–0.3	Ar	0.4	Y	conical, dir.	[33, 34]
ToU	Sasoh et al.	2–10	0.03–0.3	H_2, N_2, Ar	1	Y	conical, del.	[35, 36]
SX3	Boxberger et al.	30–114	0.4	Ar	2	Y	conical, dir.	[37, 38]

Thruster	Principal Investigators	Power (kW)	B_A (T)	Propellants	p_b (mTorr)	Error Reported?	Electrode Geometry	Refs.
WaU (s, m, l)	Nakano et al.	0.4–1	0.1–0.2	Ar	0.5	Y	conical, del.	[39]
X-2C	John and Bennett	18–170	0.08–0.3	H_2, NH_3	100	Y	conical, dir.	[40, 41]
X-2C-H2O	John and Bennett	5–12	0.07–0.3	Cs	0.1	Y	conical, dir.	[40]
X-2C-Rad	John and Bennett	4–7	0.01–0.3	Li	0.1	Y	conical, dir.	[40]
X-7 (s, m, l, xl)	Esker et al.	13–38	0.1–0.2	NH_3	10	N	conical, del.	[42]
X-7 (C-1 – C-5, CR)	Bennett et al.	9–100	0.08–0.3	NH_3	100	N	conical, del.	[43]
X9	Krülle	22–96	0-0.3	H_2, Ar	500	N	conical, del.	[44]
X13	Kurtz	5–89	0.1–0.4	Ar	10	N	cylindrical	[45]
X16	Krülle and Zeyfang	3–12	0.6	Ar, Kr, Xe	0.6	N	conical, del.	[46]

References

[1] Albertoni, R., Paganucci, F., and Andrenucci, M., "A Phemenological Model for Applied-Field MPD Thrusters," *Acta Astronautica*, Vol. 107, 2015, pp. 177–186. doi:10.1016/j.actaastro.2014.11.017.

[2] Albertoni, R., Rossetti, P., Paganucci, F., Andrenucci, M., Zuin, M., Martinez, E., and Cavazzana, R., "Experimental Study of a 100-kW Class Applied-Field MPD Thruster," *32nd International Electric Propulsion Conference*, Wiesbaden, Germany, 2011.

[3] Albertoni, R., Paganucci, F., Rossetti, P., and Andrenucci, M., "Experimental Study of a Hundred-Kilowatt-Class Applied-Field Magnetoplasmadynamic Thruster," *Journal of Propulsion and Power*, Vol. 29, No. 5, 2013, pp. 1138–1145. doi: 10.2514/1.B34688.

[4] Albertoni, R., Personal Correspondence, Oct. 9, 2016.

[5] Cann, G. L., Harder, R. L., and Moore, R. A., "Hall Current Accelerator," Tech. Rep. NASA CR-54705/EOS 5470-Final, Electro-Optical Systems, Inc., Feb. 1966.

[6] Fradkin, D. B., and Roehling, D. J., "Thrust Stand Performance Measurements of a Lithium Fueled Applied Field MPD Arcjet," *13th Symposium on the Engineering Aspects of Magnetohydrodynamics*, Stanford, CA, 1973.

[7] Fradkin, D. B., and Roehling, D. J., "Experiments in the New LASL MPD Arcjet Test Facility," Tech. Rep. LA-5199-MS, Los Alamos, Feb. 1973.

[8] Moore, R. A., Cann, G. L., and Gallagher, L. R., "High Specific Impulse Thermal Arcjet Thrustor Technology Part I: Performance of Hall Arc Jets with Lithium Propellant," Tech. Rep. AFAPL-TR-65-48, Part I, Electro-Optical Systems, Inc., June 1965.

[9] Cann, G. L., Moore, R. A., Jacobs, P. F., and Gallagher, L. R., "High Specific Impulse Thermal Arcjet Thrustor Technology," Tech. Rep. AFAPL-TR-65, Electro-Optical Systems, Inc., Sept. 1965.

[10] Cann, G. L., Moore, R. A., Harder, R. L., and Jacobs, P. F., "High Specific Impulse Thermal Arcjet Thrustor Technology Part II: Performance of Hall Arc Jets with Lithium Propellant," Tech. Rep. AFAPL-TR-65-48, Part II, Electro-Optical Systems, Inc., Jan. 1967.

[11] Jr., W. G., Hess, R. V., and Hassan, H. A., "Experiments with a Coaxial Hall Current Plasma Accelerator," *AIAA Journal*, Vol. 3, No. 6, 1965, pp. 1034–1039. doi:10.2514/3.3050.

[12] Jr., W. G., Hess, R. V., and Hassan, H. A., "Experiments with a Co-Axial Hall Current Plasma Accelerator," *AIAA 4th Electric Propulsion Conference*, Philadelphia, PA, 1964. doi:10.2514/6.1964-700.

[13] Mantenieks, M. A., Sovey, J. S., Myers, R. M., Haag, T. W., Raitano, P., and Parkes, J. E., "Performance of a 100 kW Class Applied Field MPD Thruster," *25th Joint Propulsion Conference*, Monterey, CA, 1989. doi:10.2514/6.1989-2710.

[14] Myers, R. M., Mantenieks, M., and Sovey, J., "Geometric Effects in Applied-Field MPD Thrusters," *21st International Electric Propulsion Conference*, Cleveland, OH, 1990.

[15] Haag, T. W., "Design of a Thrust Stand for High Power Electric Propulsion Devices," *25th Joint Propulsion Conference*, Monterey, CA, 1989. doi:10.2514/6.1989-2829.

[16] Myers, R. M., "Scaling of 100 kW Class Applied-Field MPD Thrusters," *28th Joint Propulsion Conference and Exhibit*, Nashville, TN, 1992.

[17] Myers, R. M., "Electromagnetic Effects in an Applied-Field Magnetoplasmadynamic Thruster," *Journal of Propulsion and Power*, Vol. 11, No. 2, 1995, pp. 343–350. doi:10.2514/3.51431.

[18] Myers, R. M., "Applied-Field MPD Thruster Geometry Effects," Tech. Rep. NASA CR-187163/AIAA-91-2342, Sverdum Technology, Inc., Lewis Research Center Group, NASA Contractor Report 187163, Aug. 1991.

[19] Myers, R. M., "Applied-Field MPD Thruster Performance with Hydrogen and Argon Propellants," *Journal of Propulsion and Power*, Vol. 9, No. 5, 1993, pp. 781–784. doi:10.2514/3.23691.

[20] Mikellides, P. G., Turchi, P. J., and Roderick, N. F., "Applied-Field Magnetoplasmadynamic Thrusters, Part 1: Numerical Simulations Using the MACH2 Code," *Journal of Propulsion and Power*, Vol. 16, No. 5, 2000, pp. 887–893. doi:10.2514/2.5656.

[21] Kim, V., Tikhonov, T., and Semenikhin, S., "The First Quarterly Report on the Stage ## 3 A of the Contract on the Research Studies No. NASW-4851 between RIAME MAI and NASA," Tech. Rep. NASW-4851, RIAME MAI, Apr. 1996.

[22] Tikhonov, V., Semenikhin, S., Brophy, J. R., and Polk, J. E., "The Experimental Performances of the 100 kW Li MPD Thruster with External Magnetic Field," *24th International Electric Propulsion Conference*, Moscow, Russia, 1995.

[23] Kim, V., Tikhonov, T., and Semenikhin, S., "The Second Quarterly Report on the Stages ##2A, B of the Contract on the Research Studies No. NASW-4851 between RIAME MAI and NASA," Tech. Rep. NASW-4851, RIAME MAI, July 1996.

[24] Kim, V., Tikhonov, T., and Semenikhin, S., "The Fourth Quarterly (Final) Report on the Stage ## 3 "C", "D" of the Contract on the Research Studies No. NASW-4851 between RIAME MAI and NASA," Tech. Rep. NASW-4851, RIAME MAI, Apr. 1997.

[25] Tikhonov, V. B., Semenikhin, S. A., Brophy, J. R., and Polk, J. E., "Performance of 130 kW MPD Thruster with an External Magnetic Field and Li as a Propellant," *25th International Electric Propulsion Conference*, Cleveland, OH, 1997.

[26] Popov, G., Kim, V., Tikhonov, T., Semenikhin, S., and Tibrina, M., "The Fourth (Final) Quarterly Report on the Milestones (a) (4) and (a) (5) (D) of SoW of Contract No. 960938 between RIAME MAI and JPL," Tech. Rep. 960938, RIAME MAI, Dec. 1998.

[27] Tikhonov, V. B., Semenikhin, S. A., and Polk, J. E., "Own Magnetic Field Impact on MPD Thrusters Performance with External Magnetic Field," *26th International Electric Propulsion Conference*, Kitakyushu, Japan, 1999.

[28] Tahara, H., Kagaya, Y., and Yoshikawa, T., "Hybrid MPD Thruster with Axial and Cusp Magnetic Fields," *20th International Electric Propulsion Conference*, Garmisch-Partenkirchen, West Germany, 1988.

[29] Tahara, H., Yasui, H., Kagaya, Y., and Yoshikawa, T., "Development of a Quasi-Steady MPD Arcjet Thruster for Near-Earth Missions," *19th AIAA/DGLR/JSASS International Electric Propulsion Conference*, Colorado Springs, CO, 1987. doi:10.2514/6.1987-1001.

[30] Tahara, H., Kagaya, Y., and Yoshikawa, T., "Performance and Acceleration Process of Quasisteady Magnetoplasmadynamic Arcjets with Applied Magnetic Fields," *Journal of Propulsion and Power*, Vol. 13, No. 5, 1997, pp. 651–658. doi:10.2514/2.5216.

[31] Tahara, H., Takiguchi, F., Kagaya, Y., and Yoshikawa, T., "Performance Characteristics and Discharge Features of a Quasi-Steady Applied-Field MPD Arcjet," *22nd International Electric Propulsion Conference*, Viareggio, Italy, 1991.

[32] Tahara, H., Kagaya, Y., and Yoshikawa, T., "Effects of Applied Magnetic Fields on Performance of a Quasisteady Magnetoplasmadynamic Arcjet," *Journal of Propulsion and Power*, Vol. 11, No. 2, 1995, pp. 337–342. doi:10.2514/3.51430.

[33] Ichihara, D., Personal Correspondence, Jan. 6, 2017.

[34] Ichihara, D., Uno, T., Kataoka, H., Jeong, J., Iwakawa, A., and Sasoh, A., "Ten-Ampere-Level, Applied-Field-Dominant Operation in Magnetoplasmadynamic Thrusters," *Journal of Propulsion and Power*, Vol. 33, No. 2, 2017, pp. 360–369. doi:10.2514/1.B36179.

[35] Sasoh, A., and Arakawa, Y., "Electromagnetic Effects in an Applied-Field Magnetoplasmadynamic Thruster," *Journal of Propulsion and Power*, Vol. 8, No. 1, 1992, pp. 98–102. doi:10.2514/3.23448.

[36] Sasoh, A., Solem, A. E., and Arakawa, Y., "Optimization of Current Distribution in an Applied-Field MPD Thruster," *20th International Electric Propulsion Conference*, Garmisch-Partenkirchen, West Germany, 1988.

[37] Boxberger, A., and Herdrich, G., "Integral Measurements of 100 kW Class Steady State Applied-Field Magnetoplasmadynamic Thruster SX3 and Perspectives of AF-MPD Technology," *35th International Electric Propulsion Conference*, Atlanta, GA, 2017.

[38] Boxberger, A., Jüstel, P., and Herdrich, G., "Performance of 100 kW Steady State Applied-Field MPD Thruster," *31st International Symposium on Space Technology and Science*, Matsuyama, Japan, 2017.

[39] Nakano, T., Ishiyama, A., Shimizu, Y., and Toki, K., "Feasibility Study of a Low-Power Applied-Field MPD Arcjet," *28th International Electric Propulsion Conference*, Toulouse, France, 2003.

[40] John, R. R., and Bennett, S., "Final Report: Arcjet Technology Research and Development," Tech. Rep. NASA CR-54687/RAD-TR-65-37, AVCO Corporation, NASA Contract NAS 3-5900, Dec. 1965.

[41] Jones, R. E., and Walker, E. L., "Status of Large Vacuum Facility Tests of MPD Arc Thrustor," *3rd Aerospace Sciences Meeting*, New York, NY, 1966. doi:10.2514/6.1966-117.

[42] Esker, D. W., Kroutil, J. C., and Checkley, R. J., "Radiation Cooled MPD Arc Thruster," Tech. Rep. NASA CR-72557/MDC-H296, McDonnell Research Laboratories, NASA Contract NAS 3-11518, July 1969.

[43] Bennett, S., Enos, G., John, R., and Powers, W., "Final Report: Magnetoplasmadynamic Thrustor Research," Tech. Rep. NASA CR-72345/AVSSD-0272-67-RR, AVCO Missiles, Space, and Electronics Group, NASA Contract NAS 3-8907, May 1967.

[44] Kruelle, G., "Characteristics and Local Analysis of MPD Thruster Operation," *AIAA Electric Propulsion and Plasmadynamics Conference*, Colorado Springs, CO, 1967. doi:10.2514/6.1967-672.

[45] Kurtz, H., "Integrale Messungen an einem Axialsymmetrischen Elektronmagnetischen Plasmabeschleuniger (Triebwerksmodell X-13) (Integral Measurements on an Axial-symmetric Electromagnetic Plasma Thruster (Model X-13))," Ph.D. thesis, Deutsche Forschungs und Versuchsanstalt für Luft und Raumfahrt, Aug. 1971.

[46] Krülle, G., and Zeyfang, E., "Preliminary Conclusions of Continuous Applied Field Electromagnetic Thruster Research at DFVLR," *AIAA 11th Electric Propulsion Conference*, New Orleans, LA, 1975. doi:10.2514/6.1975-417.