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Investigating Effects of Operating Conditions on the Properties of Inductively Coupled Plasma Produced by the Conical and Fassel Torches XIAOMAN GUO, SINA ALAVI, ELHAM DALIR, JAVAD MOSTAGHIMI[1], university of toronto, CACT TEAM — Inductively coupled plasma (ICP) is a powerful excitation/ionization source. In this work, systematic investigation about the combined effects of operating conditions on the properties of ICP is conducted by experiments and simulations. The excitation temperature and electron number density of the new Conical torch ICP and conventional Fassel torch ICP are studied and compared under a wide array of conditions. Two power levels and three injector tubes are investigated for both torches, while three intermediate gas flow rates are tested for the Fassel torch. The Conical torch at 900 W is shown to offer 400 K – 1200 K higher excitation temperature and 0.5 – 2 times higher electron number density compared with the Fassel torch at 1500 W and 1100 W. Also, smaller injector tube is found to increase the excitation temperature and electron number density for both torches. Moreover, for the Fassel torch, lower intermediate gas flow rate is shown to offer better values but can also bring the position change and strong circulation. In general, the Conical torch, with less gas and power consumption, presents better properties than the Fassel torch. This comprehensive investigation is expected to contribute to the development of ICP systems for further applications.

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