Contribution ID: **611** Type: **Invited Speaker / Conférencier invité**

Compact Torus Injection for Fuelling

Wednesday 17 June 2015 14:45 (30 minutes)

Current fueling technologies, such as gas puffing or pellet injection, are unable to send fuels directly to the reactor core due to premature evaporation and ionization at the edge of the reactor. Compact torus (CT) injection as a means for fueling a magnetically confinement fusion reactor as a research topic at the University of Saskatchewan started in early 90's. Compact torus formed in a magnetized coaxial gun is confined by the magnetic field self-induced by the current in CT. This robust high density plasmoid can be accelerated to a high velocity to penetrate the magnetic field gradient in tokamaks to reach the core of the reactor. Plasma Physics Laboratory built the first CT injector which demonstrated first disruption-free CT injection on TdeV. Soon after that, the University of Saskatchewan Compact Torus Injector (USCTI) was designed and built specifically to inject a low-mass CT into the STOR-M tokamak. Over the last two decades, USCTI has made several unique contributions to this research area. This talk will briefly summarize the results of the following experiments: a) demonstration of H-mode like discharge and MHD suppression induced by CT injection into the STOR-M tokamak, b) modification of plasma toroidal flow velocity towards the tangential CT injection direction, and c) demonstration of the record high frequency of repetitive CT formation.

*supported by NSERC, CRC and SF-CCNI

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Session Classification: W2-6 Special session to honor Dr. Akira Hirose IV (DPP) / Session spéciale en l'honneur du Dr Akira Hirose IV (DPP)

Track Classification: Plasma Physics / Physique des plasmas (DPP)