Development of Compact Neutron Generators by Using Ion Sources

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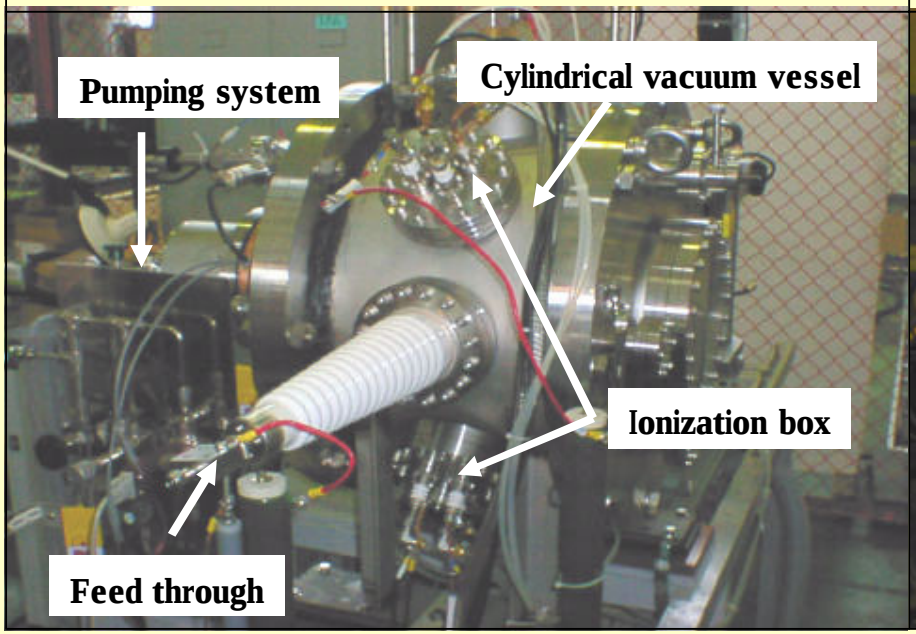
(1) Improved plasma discharge for an IEC by using ion sources
- differential pumping system and ionization boxes

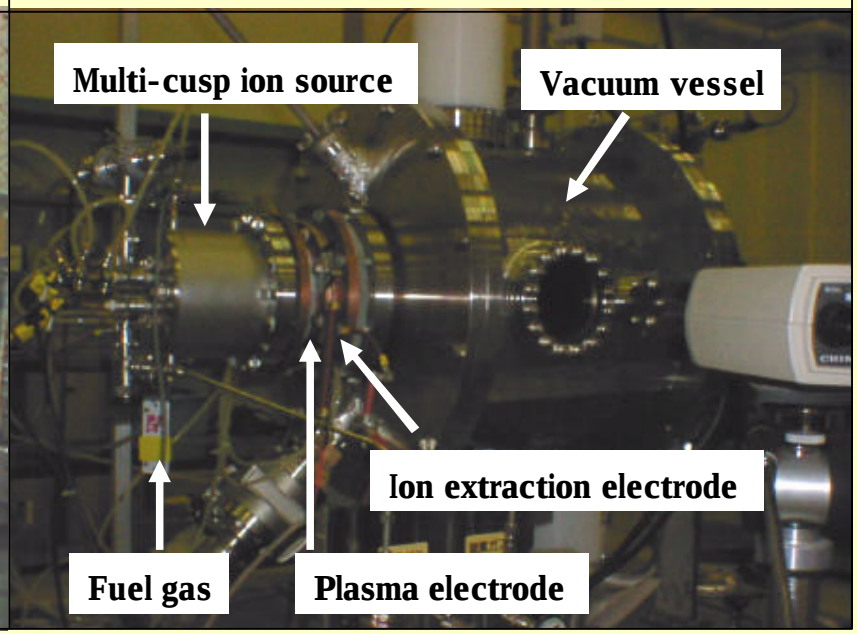
(2) Feasibility study of a simple neutron generatorfor an industrial use
- a multi-cusp ion source + a water cooled Ti target

Whole View of the Devices

(1) the IEC device by using ion sources



(2) the electrostatic accelerator fusion device

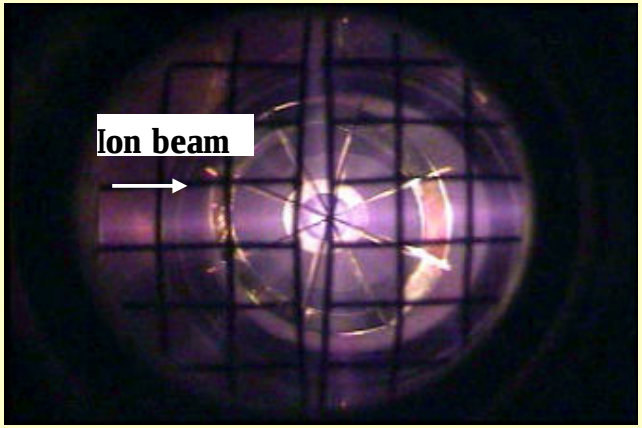


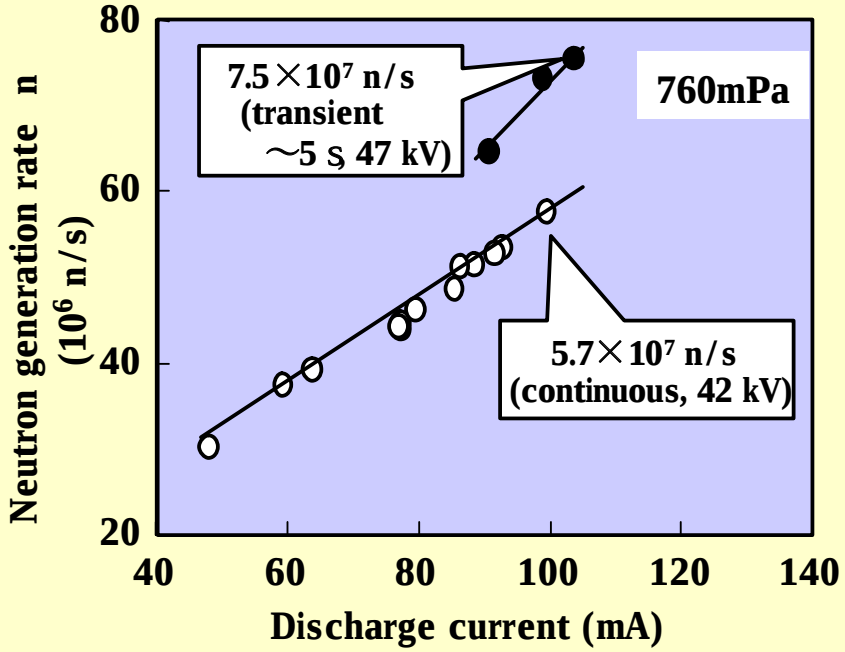
(1) Improved plasma discharge for an IEC by using ion sources

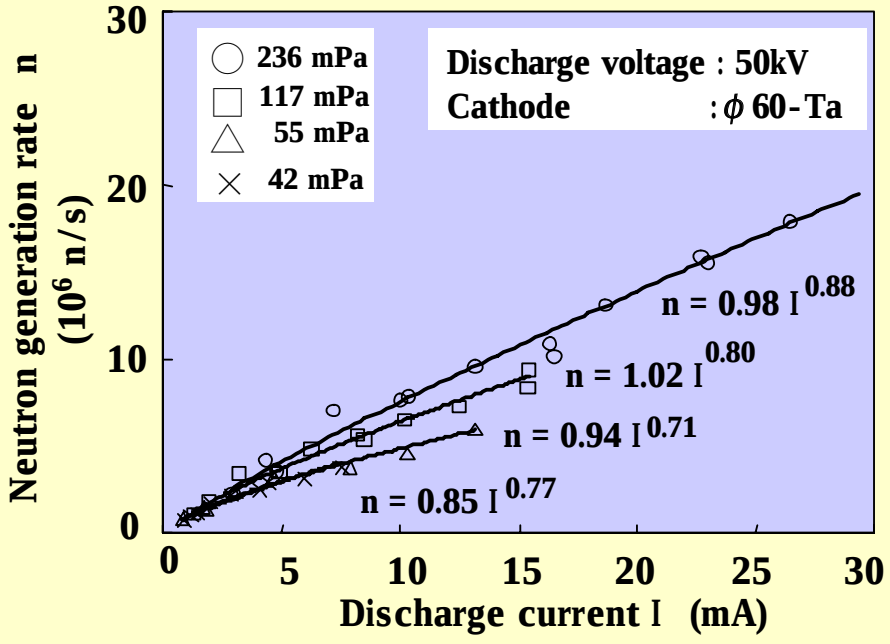
- Maximum neutron generation rate
  - Quasi steady state dc operation 5.7×10^7 n/s
  - Transient 7.5×10^7 n/s

- Exponent of discharge current dependence on neutron generation rate
  - is lower with lower gas pressure
  - is higher with higher discharge voltage

Ion beams assisted plasma discharge







(2) Feasibility study of a simple neutron generatorfor

- Neutron production rate
  - $\propto$ (acceleration voltage) $^{3.64}$ $\sim$ Range $\times \sigma_{DD}$
  - $\propto$ (ion current)$^{1.0\sim1.35}$

-- Estimation of 100kW class DD neutron generator
  $3.0\times10^{10} \sim 1.0\times10^{11}$ n/s