

SINGAP: 1 MeV 100 mA D⁻ DC Accelerator for Thermonuclear Fusion, C.ÉDESGRANGES, M.ÉFUMELLI R.S. HEMSWORTH, P. MASSMANN, A. SIMONIN, Association EURATOM-CEA, CEA/Cadarache, France - Injection of intense neutral beams (several tens of MW) based on the neutralisation of negative deuterium ions up to energies of 1 MeV is an important option for plasma heating in thermonuclear fusion machines. At Cadarache, research is performed regarding the development of an electrostatic accelerator 1 MeV 100 mA (20 mA/cm²) (called SINGAP), and multi-amperes sources. The particular feature of SINGAP, is the simplified accelerating structure: the negative ions are pre-accelerated in a multi-aperture structure at 60 keV in 10 independent channels, then merged in a single beam by means of an electrostatic lens, which is accelerated in a single gap to 1 MeV. Voltage holding without beam has been demonstrated at above 1 MV after only 35 min of integrated voltage on-time. Negative ion beams has been realised up to 860 keV, the measurement of the beam profiles are in good agreement with the results obtained from 3D trajectory calculations. Subjects of the study are the voltage holding at 1 MV with an associated dark current due to large electrodes areas (about 60 m²). A degradation of the voltage holding with the time has been observed related to a progressive deterioration of the epoxy insulators under vacuum.