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## FTP/P1-18: Progress in the Development of Long Pulse Neutral Beam Injectors for JT-60SA

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To realize a 100 s injection of neutral beams for JT-60 Super Advanced (JT-60SA), the feasibility of the long-pulse production of the ion beams is investigated. Using the JT-60 positive ion source, the long-pulse production of the positive ion beams is confirmed to be feasible for JT-60SA by analyzing the results obtained in the productions of full power D<sup>+</sup> ion beams of 85 keV, 27.5 A for 30 s and a half power H<sup>+</sup> ion beams of 60 keV, 18A for 200 s. This shows that the JT-60 positive ion source is expected to be reused in JT-60SA without modifications. To realize a stable acceleration of the high current D<sup>-</sup> ion beams of 500 keV for 100 s without interruptions due to breakdowns, vacuum voltage holding capability of the multi-aperture grid designed for JT-60 SA is firstly clarified in the world. Based on results, the gap length of the accelerator was tuned for the grid area and number of the apertures for JT-60SA. As the result, high voltage holding during 100 s without breakdowns was attained at 200 kV for one acceleration gap at an optimum gap length for sufficient suppressions of the beam losses. This suggests that stable long-pulse acceleration to 500 keV could be expected for three acceleration stages in JT-60SA.

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