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A repetitive high current e-beam accelerator based on spark gap switch and liquid forming line HANWU YANG, ZICHENG ZHANG, JINGMING GAO, TAO XUN, SONG LI, National University of Defense Technology — Studies of a multi-gigawatt high power microwave (HPM) tube require an e-beam accelerator in the tens gigawatt GW level. Such a repetitive accelerator is built and it has a Tesla transformer (TT) and a helical liquid insulated forming line (PFL). The primary capacitor of the transformer is charged by a constant-current high voltage power supply of 120 kJ/s. The TT is an open-core autotransformer, with coupling coefficient greater than 0.9 and output voltage up to 1.2 MV. The co-axial forming line is insulated with water-ethanol mixture, to achieve an optimum dielectric constant and line impedance. The forming line is switched by to the transmission line by a SF_6 gas switch. The transmission line is used to further increase the HPM load voltage. A ceramic interface is used for improving vacuum level. The accelerator operates well with 5 Hz repetition, 80 ns FWHM and about 30 GW peak power.

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