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Decay of runaway electron current BORIS BREIZMAN, Institute for Fusion Studies, The University of Texas at Austin — The population of relativistic runaway electrons in a tokamak tends to grow exponentially via avalanche mechanism when the inductive electric field exceeds a critical value determined by the background electron density. As a result of this avalanche growth, the current of runaway electrons can quickly replace the initial current carried by the bulk plasma electrons. In the absence of external current drive, the runaway current will then decay slowly in line with dissipation of the stored poloidal magnetic field energy. A noteworthy feature of this decay is that it occurs in a self-sustained mode of marginal criticality: the inductive electric field has to be close to its critical value at every location where the runaway current density is finite, and the current density should vanish at any point where the electric field drops below its critical value. Based on this nonlinear "Ohms law" for runaways, a complete description has been constructed in this work for the time evolution of the toroidal current profile.

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