# Dynamic evolution of runaway electron energy distribution during tokamak disruptions

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The dynamics of runaway electron energy distribution during tokamak disruptions is described by a 0D model taking collision, bremsstrahlung, synchrotron radiation and also electric field into account. It is shown that the collision term is sensitive to the low energy range of runaway electrons but the bremsstrahlung and synchrotron radiation terms are more effective on the high energy runaway electrons. Contribution from the external electric field mainly affect the relatively medium energy runaways. This model introduces new features in the test equations describing dynamic evolution of runaway electron energy distribution:

1) During massive gas injection into post-disruption runaway electron plateaus, it is shown that for a massive injection of a low-Z gas such as helium and hydrogen to the RE beam generated by argon injection during the disruptions, the dependence of bremsstrahlung on the injection amount is non-monotonous. When the injection amount is less than a threshold, the bremsstrahlung will decrease and then the maximum RE energy increase, which can even improve RE generation. For a massive injection of a medium-Z gas such as neon and argon, the bremsstrahlung will increase continually leading to more RE losses and a decrease of the maximum RE energy.
2) During a large negative loop voltage applied on post-disruption runaway electron plateaus, it is shown that the electric field de-accelerates REs and mainly decrease the RE energy in the medium-energy range. When the added electric field is large enough, it can possibly drive an energetic electron instability, causing the anomalous runaway losses.