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In tokamak-reactor, such as ITER, the generation of runaway electrons (RE) is unacceptable. Disruption Mitigation System (DMS) designed in ITER should be a reliable tool for suppression of RE and mitigate other detrimental consequences of disruptions. Elaboration of the RE database and its comprehensive analysis should stimulate further advances in understanding of the physics of RE and their interaction with plasma and neutral gases (fuel and injected impurities) for development of ITER DMS. From the beginning of JET operations there were several attempts to review the data on RE generation events (for example, [1]). However, these attempts are still waiting a compiling into joint database.
This report presents the first summary analysis of the most extended data on RE generation in JET disruptions. This data includes more than 1800 RE generation events in disruptions before and after divertor installation, with metal and carbon limiters (JET-C) and with ITER-like Wall (JET-ILW), in spontaneous disruptions and those triggered by slow gas puff and Massive Gas Injections (MGI). This analysis confirms some previous results from JET-C and JET-ILW on the current conversion < 0.6-0.7 for both cases. Present work revealed a generation of RE plateaux in several high current spontaneous disruptions in JET-C with maximal values of the disrupted currents < 6.25 MA extending upper currents boundary of the data. In JET-ILW the RE data was collected in MGI experiments with currents 2MA. Unlike to previous studies carried out on the basis of limited number of RE generation events, this report shows that RE plateaux were detected in JET-C at very low q(a) < 2.5, with current plateaux sometimes achieving 3 MA and with up to 2 MA of the RE fraction. In contrary to our previous conclusions, a systematic analysis of the data on RE in JET-C and JET-ILW revealed an absence of the "so-called" threshold on magnetic field values. Analysis of current quench (CQ) stages allowed distinguishing several groups of disruptions: with constant CQ rate during the first milliseconds (3-8) in the beginning of decay, which corresponds to exponential decay of the resistive plasma current; the disruptions with substantially varied CQ rates; and, a third group includes disruptions with RE but without measurable CQ stage, i.e. when generation was detected immediately after the thermal quench. All data on CQ and RE plateaux dynamics was used in study of the functional dependencies of photo-neutron and HXR emissions vs. RE currents allowing assessment of densities and energies of RE fractions. Measurements of HXR, gammas and photo-neutrons with time-resolved HXR monitors, neutron rate fission chamber monitors, NaI(Tl), BGO and LaBr spectrometers together with JET neutron/gamma profile monitor (2 cameras, vertical and horizontal, with 9 and 10 lines of sight) allowed evaluation RE energy (up to 30 MeV in JET-C and 10-15 in JET-ILW) and observe spatial evolution of RE beam [2].
[1] 1990 Preprint JET-R(90)07, Harris G.R. Comparison of the current decay during carbon-bounded and beryllium-bounded disruptions in JET. [2] 1988 Nuclear Fusion O.N. Jarvis et al "Photo-neutron production accompanying plasma disruptions in JET"

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