Contribution ID: **218** Type: **Poster**

Peculiar Properties of Disruptions on T-10 Tokamak at Different Edge Safety Factor Values

Thursday, October 25, 2018 8:30 AM (20 minutes)

One of the main goals of researching global plasma disruptions is to find a way to prevent the formation of runaway electron beams, after the plasma current disruption. A possible way to solve this problem is to generation of strong MHD perturbation during current decay. The experimental study of density limit disruption on tokamak T-10, for study dependency a duration of plasma current decay t95 (from 100% to 5% of plasma current on quasi state stage of discharge) from edge safety factor q_a was curry out. As result, it was found that, if value qa integer or half-integer than duration of plasma current decay is high increase, up to 100-115 ms.

The increased duration of current decay is uniquely relate with qa, what showed in experiments where changing of the value of toroidal field and plasma current with constant qa do not lead to changing character and duration of current decay. From the available experimental data it follows that during slow current decay while plasma column move to high field side, one at a time multiple extensions and contractions by minor radius are occur. The moment of time when the plasma column expands is correlated with peaks on the loop voltage and with peaks on the MHD perturbation of poloidal magnetic field. The main character feature of disruption with a slow current decay is absence of hard X-rays. Thus, from available experimental data, we can conclude, that during a slow current decay, high MHD activity lead to prevent the formation of runaway electron beams.

Country or International Organization

Russian Federation

Paper Number

EX/P5-16

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Session Classification: P5 Posters