DISRUPTIONS IN CLASSICAL “CIRСULAR SHAPE” TOKAMAKS

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The purpose of the review is to bring together well-known [1,2] and little-known facts concerning the nature of the occurrence and development of large-scale disruptions in tokamaks. The subject of discussion is mainly limited to disruptions in classic "circular shape" tokamaks, where the bulk of experimental information accumulated in this area over the past 50 years is currently most systematized. This restriction allows you to focus as much as possible on physics of disruptions, temporarily distracting from technical issues related to the development of disruption in specific magnetic configurations, in particular, in D-shaped and compact torus. The review will cover the following issues:

1. Disruptions as an obstacle to the creation of a tokamak reactor.
2. Phenomenology of disruptions through the eyes of an external observer.
3. Diagnosis of disruptions.
4. The phenomenology of "miner" and "major" disruptions.
5. Large-scale external and internal MHD activity in disruptions.
6. Turbulence in disruptions.
7. Impurities in disruptions.
8. Evolution of physical concepts about the nature of major and minor disruptions.
9. Disruptions in D-shaped tokamaks, compact torus and stellarators with ohmic current.
10. Possible ways to eliminate the impact of disruptions on the operation of the tokamak reactor.

References

1. ITER Physics Expert Group on Disruptions, Plasma Control, and MHD, ITER Physics Basis Editors, Nuclear Fusion **39**, 2251 (1999).
2. S.V. Mirnov, «Magnetic Islands and Current Filamentation in Tokamaks**»**Plasma Physics Reports, 2019, Vol. 45, No. 2, pp. 87–107, *published in Fizika Plazmy, 2019, Vol. 45, No. 2, pp. 99–119.*