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**Unsteady magnetic reconnection in laboratory experiments with current sheets** ANNA FRANK, Prokhorov General Physics Institute of the Russian Academy of Sciences — According to present notion, unsteady magnetic reconnection in current sheets (CS) is basic to dramatic natural phenomena: solar and stellar flares, substorms in the Earth and other planetary magnetospheres, as well as to disruptive instabilities in tokamak plasmas. We present a review of laboratory experiments studying evolution of CS formed in 3D and 2D magnetic configurations with an X line, in the CS-3D device. Usually CS exists during an extended period in a metastable stage, without essential changes of its structure and parameters. Under certain conditions this stage may be suddenly interrupted by unsteady phase of magnetic reconnection, which manifests itself in a rapid change of the magnetic field topology, current redistribution, excitation of pulsed electric fields, and other dynamic effects. The unsteady phase results in effective conversion of magnetic energy into the energy of plasma and accelerated particles, and may finally bring about the CS disruption. In the context of the solar flares, a metastable CS is associated with a pre-flare situation, while CS disruption – with the flare itself. The physical mechanisms triggering the unsteady magnetic reconnection in the laboratory produced current sheets are discussed. Supported by the Russian Foundation for Basic Research (project # 09-02-00971).

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