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A TURBULENCE IN THE LASER FUSION TARGETS *)

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A development of the hydrodynamics instabilities and the phenomena of the different layers mixing is one of principle characteristics of the laser fusion targets implosion. The interpenetration of the materials of an inert shell (beryllium, glass, polyethylene, high density carbon and so on) and a nuclear fuel (deuterium, carbon deuterated, deuterium-tritium mixes etc.) leads to a decrease of a temperature of the central region and, so on, gives to an impossibility of the ignition. 1D modelling shows, that, as a rule, one takes place a great efficiency of thermonuclear combustions. But, taking into account the different heterogeneities, that possible may have a place, leads to a significant limitation for a fusion production. So, the key problem of a robustness of a nuclear target is the origin and development of any hydrodynamics instabilities and a resulting mixing of the layers.

The phenomena of the origin and further evolution of the hydrodynamics instabilities and its transformation into a mixing phenomenon considerably depends on the initial state and having conditions. So, we need to distinguish two the principle realizations of the turbulent flows. The first is the long time existence and regularly reproducible turbulent state, as well as, an observable gas or liquid flow around some of a profile in aerodynamics, some flows in the pipes, atmospheric flows. The second type is a typical problem of the laser fusion target compression. In such the case, we have dealing with a development of some kind of a hydrodynamic instability (Raleigh-Taylor, Rihtmyer-Meshkov, Kelvin-Helmholtz) and turning it into a mixing. Such kind of turbulence is characterized of a limited time growth (about some of ten inverse increments).

So, in the presentation, we formulate the effective model of a mixing description in the laser targets.

*) abstracts of this report in Russian