

Abstract Submitted  
for the DPP12 Meeting of  
The American Physical Society

**Magnetic fusion: progress → stagnation → degradation**<sup>1</sup> LEONID ZAKHAROV, Princeton University, PPPL — “The theory of the failure of magnetic fusion,” created in 2004 and presented to APS-2007 introduced the notion of the “difficult” and “complicated” stages of the program and described them details. At the first phase the emerging fusion science was created under strong leadership. Progress was visible on year to year basis, and the program was easy to manage. The complicated phase started in the late 1980s, when the plasma physics appeared to be incapable to implement the mission of ITER to test nuclear components of a fusion reactor. Then, the failure of TFTR (PPPL, USA) and JET (Culham, UK) in the mid 1990 to demonstrate  $Q_{DT} = 1$  and the blindness of their leaders to already visible means to resolve the problem, were a clear indication of an irreversible stagnation. In fact, right after 2007, it became clear that in the case of a large system of human “particles” (scientists) two phases have a continuation. The internal degrees of freedom, otherwise protected from external perturbations by a strong dedication to the scientific method, are now eroding and collapsing. The loss of science in addressing confinement, stability, power extraction, fueling, stationary regimes issues makes the current program irrelevant to fusion energy. A fresh approach should be taken.

<sup>1</sup>This work is supported by US DoE contract No. DE-AC02-09-CH11466

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Date submitted: 02 Aug 2012

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