A concept of a local spherical blanket applied for MTF systems

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A concept of a local spherical blanket for pulsed fusion systems has been analyzed in great deal of detail by B.G. Logan ([1] and references therein) and, more recently, by M. Derzon [2], and D. Ryutov and A. Toor [3]. The blanket material (Li, LiPb, Flibe, or LiH) forms a sphere in the center of which a fusion energy release occurs. The fusion neutrons propagate through the blanket and breed tritium; they cause also the pulsed volumetric heating of the blanket, its evaporation and ionization. The ionized material serves then as a working fluid for the MHD generator.

We discuss a possible use of a spherical blanket for Magnetized Target Fusion (MTF) systems. These systems can be driven by the current pulse with the pulse duration in the range of a few microseconds and a maximum current ~ 10 MA. The current pulse with such parameters can be generated by crushing magnetic flux conserver (integrated with the spherical blanket) by a fast projectile [3, 4]. A power transmission line will be integrated with the spherical blanket.

In each shot, the ball made of one of the aforementioned materials, together with the enclosed fusion capsule, will be dropped into the reactor chamber. We consider design options oriented both at a significant ionization of the ball, and at its mere evaporation. In the latter case the vapor will be used to drive a turbo-generator. We discuss electrical and mechanical issues of the spherical blankets and conclude that, potentially, they can lead to an attractive MTF power reactor.

Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract W-7405-ENG-48.

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