Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Cavitation in microscale confinement: new concept of mild brain injury.[1] ISKANDER AKHATOV, CHENG WANG, MARIUSZ ZIEJEWSKI, North Dakota State University — The present effort is to understand the possible damages in brain caused by the cavitation bubbles generated when the impacting shock waves passing through human head. In order to build an adequate mathematical model of this phenomenon, one should be able to model inception and dynamics of cavitation in biological liquid confined in macroscale or microscale space between solids, elastic surfaces, or membranes – biological tissues, in general. A more in-depth understanding of the outcomes from the dynamic response of brain tissue, including the location, size, and geometry of the damage site, will be of assistance to physicians in the properly interpreting the neurodiagnostic results. In the present study it is stated that in micro scale confinement bubble collapse can not cause any damage. This is due to the fact that collapse is damped by viscous dissipation in micro channels. Otherwise, the bubble inception itself may cause damage. It is shown that cavitation inception in micro scale may happen for much higher tensions than in infinite liquid. At such a strong tension substantial amount of elastic energy is stored in liquid. This energy being released during cavitation inception generates 'recoil pressure' that may be high enough to damage biological tissue.

[1]Authors acknowledge support from FM Foundation.

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Date submitted: 31 Jul 2007 Electronic form version 1.4