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Dynamics of Bubble Supercompression in Organic Liquids

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Theoretical research of vapor bubbles in deuterated acetone and benzol is conducted. On the basis of the developed models of a single bubble and bubble cluster the dynamics of bubbles formed during maximum rarefaction in the liquid is investigated. It is shown that during the rapid contraction of a bubble a shock wave is formed inside it. Shock wave focusing in its center leads to violent rise in density (10^4 kg/m^3), pressure (10^{10}–10^{11} bar) and temperature (10^8–10^9 K), high enough to produce nuclear reactions. The diameter of the neutron emission zone is about 100 nm. It has been found out that the intensity of the bubble collapse and the number of emitted neutrons increase if one varies the phase of nucleation, the positive pressure wave amplitude, the liquid temperature, and when one switches on the mechanism of bubbles coagulation in the cluster during its simultaneous explosion.

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