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Theory of the Motion of Ball Lightning PETER HANDEL, Univ. of MO St Louis Physics & Astron. Dept — The Maser-Soliton Theory of BL predicts the dynamics of each of the harmonic waves in the wave packet that feeds and in fact defines the Langmuir plasma soliton that is observed as BL. The frequencies in the wave packet are in a narrow window f that corresponds in the case of open air BL to the diameter of the area in which the damage caused by the final explosion of the BL is observed. This is usually of the order of Δx=30 m roughly, in rms. The corresponding wave vector interval is Δk=(1/2)(1/30m)=0.017/m in rms. At the same time, k is of the order of 6/m, yielding k/Δk=360. This pronounced line-narrowing is obtained due to the large gain of the atmospheric maser when it generates the Kapitsa standing wave. Phase differences between the waves that make up the electromagnetic field that couples with the electrostatic field of the soliton are determined by the frequency dependence of gain and dissipation. They are influenced less by the motion of the air, than by the maser dynamics and by the boundary conditions shaping the electromagnetic field, i.e. the individual photonic wave-packet. The paper presents the equations that determine the phase dynamics and therefore also the observed motion of BL. A similar phase dynamics is expected to be applicable to the special case of UFO motions.

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