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$$u_{tt} - \Delta u + u - u^3 = 0. \qquad (1)$$

The equation (1) possesses nontrivial steady-state solutions, i.e., plane one-dimensional solutions[2] and spherically-symmetric (ss) PLS [3,4]. But they have turned out to be unstable [5,8]. On the other hand, in the framework of Eq. (1) in (x,t) case ($\Delta \to \frac{\partial^2}{\partial x^2}$) stable* self-localized nonlinear oscillations have been described [9] (let us call them "pulsons" for brevity).

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Of course, spatial PLS are of more interest for the elementary particle physics. For the first time long-lived ss-pulsons were found by investigation of the Higgs field equation (see paper [10]). Their amplitude $c(t)$ decreases slowly as a result of slight radiation and their life-time τ is $\sim 10^3$. In the present paper we shall find and investigate ss-pulsons of Eq. (1) applying the Fourier method in the presence of small parameter $(u^2 \ll 1)$ [9] and using a computer.

We shall look for the solution of Eq.(1) in the following form

$$u(r,t) = a(r)\cdot\cos\omega t + b(r)\cdot\cos 3\omega t + \ldots \qquad (2)$$

Substituting the expression (2) into Eq.(1) we obtain the nonlinear eigenvalue problem

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Let $y(r)$ be its solution at $\lambda = 1$. One can easily see that then $y_\lambda = \sqrt{\lambda}\, y(\sqrt{\lambda}\, r)$ is the solution of Eq. (3) at given $\lambda = 1-\omega^2$. Introduce $A = \sqrt{\frac{3}{4}}\, a$. The equation which one obtains for the variable A,

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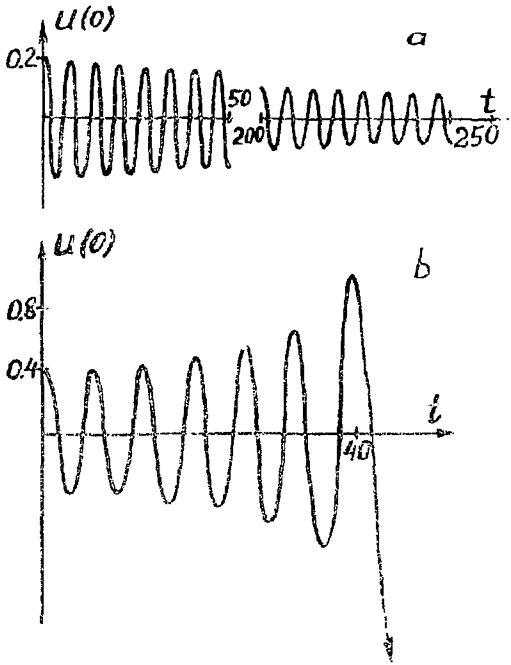
The field bunch obtained by compressing (5) along r-axis ($k > 1$) at fixed amplitude gradually gets wider, so that $R_c \to \infty$ at $t \to \infty$ and $c(t)$ monotonously decreases (Fig. 1a). On the contrary, the bunch which is wider than the pulson (5) ($k < 1$) begins collapse to the centre with $c(t)$ increasing (the closer k to unity, the slower) up to value $u_{cr} \sim 1$. Then the "explosive" (more fast than the exponential one) appearance of the field singularity takes place,



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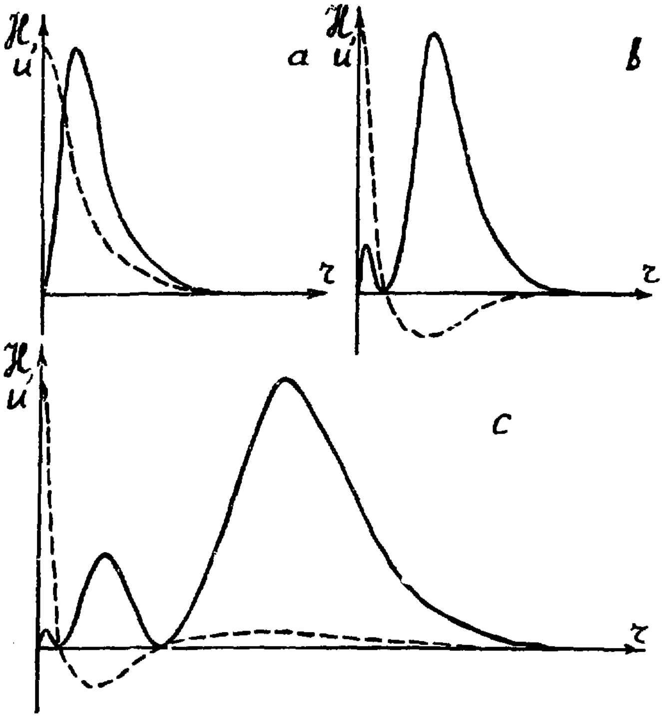

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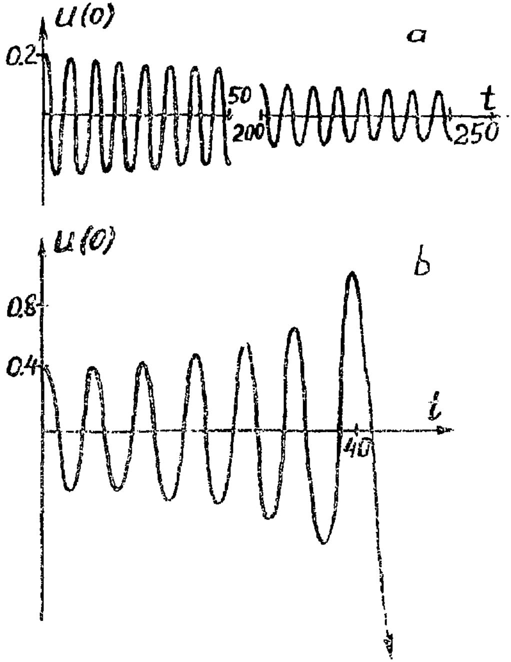

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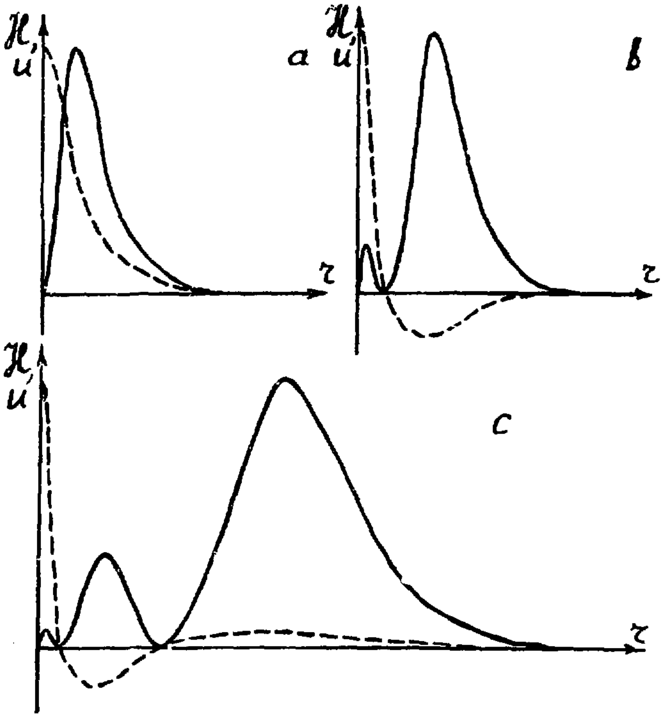

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