SOLITARY WAVES IN FLUIDS WITH VARIABLE DISPERSION

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We study the problem of dynamics the 2D and 3D solitary waves in fluids with the varying in time and space dispersive parameter $\beta = \beta(t, \mathbf{r})$. For example, that have place on studying of the evolution of the 3D FMS waves in magnetized plasma, which is described by the KP equation [1], when β is a function of the Alfvén velocity $v_A = f[B(t, \mathbf{r}), n(t, \mathbf{r})]$ (n is the plasma density) and the angle $\theta = \theta(\mathbf{k} \wedge \mathbf{B})$: $\beta = v_A(c^2 / 2\omega_{0i}^2)(\cot^2\theta - m_e / m_i)$. Similar situation takes place for the ion-acoustic (IA) waves in collisional dusty plasma when in the absence of dissipation the dispersion law are $\omega = kV_S$ where $V_S = \sqrt{(T_e / m_i)(n_{i0} / n_{e0}) + T_i / m_i}$ is the IA speed in dissipationless plasma with constant-charge dust. It is clear that the dispersion will be variable with variation of ratio of plasma components. Similar situation can also take place for solitary waves on shallow water with variable depth [1]. We present here the results of numerical simulation of the solitary waves in the KP model distracting from a specific type of medium for different model functions β. As a result we have obtained the different types of stable and unstable solutions including the solutions of the mixed "soliton – non-soliton" type for different character of dispersion variations.

Acknowledgement. The work is performed according to the Russian Government Program of Competitive Growth of Kazan Federal University.

References

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