The Babenko equation: derivation, numerics and solutions

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Outline

The Babenko equation: statement of the problem

Equations of the following form are considered:

$$u_t + f(u)_x + \mathcal{L}u_x = 0 \tag{1}$$

where $f(\eta)$ is a non-linear flux function and $\mathcal{L}$ is a linear dispersion operator:

$$\widehat{\mathcal{L}u}(k) = \alpha(k)\ \widehat{u}(k).$$

The Babenko equation: statement of the problem

Equations of the following form are considered:
The Whitham equation:

$$u_t + \frac{3}{2} u u_x + K * u_x = 0. \tag{2}$$

$$\widehat{K * u}(k) = \sqrt{\frac{\tanh(k)}{k}}\ \widehat{u}(k).$$

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The KdV equation:

$$u_t + \frac{3}{2} u u_x + u_x + \frac{1}{6} u_{xxx} = 0. \tag{3}$$