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MODELLING OF WAVE - CURRENT INTERACTION IN COASTAL AREAS BASED ON HYPERBOLIC MILD-SLOPE EQUATION

R. Demchenko (1), **M. Zheleznyak** (1,2)

(1) Institute of Mathematical Machines and System Problems, Kiev, (2) Ukrainian Center of Environmental and Water Projects (mark@immsp.kiev.ua/Fax: +380-44-2663615)

It was shown by Copeland (1985) that the elliptic mild-slope wave equation can be transformed into the hyperbolic system as a pair of first-order equations. This model describes a combination of refraction, diffraction and reflection. The last could be very important for harbor modelling where diffraction and reflection from the jetties has significant impact on the wave field transformation. The hyperbolic versions of mild Ű slope equating can be numerically solved more efficiently that the elliptic one with the clear tratment of the boundary conditions, that is especially important for the cases of the complicated coastal geometry..

Within the study the hyperbolic version of the mild-slope equation was expanded for the case of the wave interactions with a slowly varying currents. The efficient numerical schemes can be developed for such hyperbolic equation, describing wave transformation on currents above uneven bottom.

For the simplified 1-D case the numerical solutions the equation describing the wave transformation on homogenous currents above flat bottom is compared with the experimental data of Thomas (1981). The experimental data of Sakai (1998) were used for model testing in 1-D case of wave transformation on currents above uneven bottom.

One of the most important application of this model is the simulation of wave transformation in coastal areas at the river mouth. The changes in the wave pattern in dependence from the river discharge are analyzed on the basis of the results of the numerical modeling of the wave transformation in such area.