1060-76-6   **Anatoliy K. Prykarpatsky*** (`pryk.anat@ua.fm`), 21-D Rozdroze Str. Apt. 1, 30-361 Krakow, Poland, and **Ziemowit Popowicz** (`ziemek@ift.uni.wroc.pl`), University of Wroclaw, 9 Max Born, 50-204 Wroclaw, Poland. *THE NON-POLYNOMIAL CONSERVATION LAWS AND INTEGRABILITY ANALYSIS OF A GENERALIZED RIEMANN TYPE HYDRODYNAMICAL EQUATION.* Preliminary report.

Based on the gradient-holonomic algorithm we analyze the integrability property of the generalized hydrodynamical Riemann type equation $D_t^N u = 0$ for arbitrary $N \in \mathbb{Z}_+$. The infinite hierarchies of polynomial and non-polynomial conservation laws, both dispersive and dispersionless are constructed. Special attention is paid to the cases $N = 2, 3$ and $N = 4$, for which the conservation laws, Lax type representations and bi-Hamiltonian structures are analyzed in detail. We also show that the case $N = 2$ is equivalent to a generalized Hunter-Saxton dynamical system, whose integrability follows from the results obtained. As a byproduct of our analysis we demonstrate a new set of non-polynomial conservation laws for the related Hunter-Saxton equation. (Received December 30, 2009)