1173-76-299 **PAVEL M LUSHNIKOV***, MSC01 1115, 1 University of New Mexico, Albuquerque, NM 871310001. *Complex singularities, integrability and short branch cuts in surface dynamics.*

A potential motion of deep incompressible fluid with a free surface in 2D geometry. A time-dependent conformal mapping of the lower complex half-plane of the auxiliary complex variable w into the area filled with fluid is performed. Fluid dynamics is fully characterized by the motion of complex singularities in w plane. We found an infinite number of commuting integrals of motion which could be a sign of Hamiltonian integrability of fully nonlinear surface dynamics. We consider short branch cut approximation of the dynamics. Fluid dynamics is reduced to the complex Hopf equation for the complex velocity coupled with the complex transport equation for the conformal mapping. These equations are fully integrable by characteristics producing the infinite family of solutions, including pairs of moving square root branch points. Solutions are compared with the simulations of the full Eulerian dynamics giving excellent agreement. We consider the dynamics of singularities and finite time blowup of Constantin-Lax-Majda equation which corresponds to non-potential effective motion of non-viscous fluid with competing convection and vorticity stretching terms. A family of exact solutions is found together with different types of complex singularities approaching the real line in finite times. (Received September 21, 2021)