1172-76-286 **Sergey A Dyachenko*** (sergeydy@buffalo.edu), Department of Mathematics, Buffalo, NY 14260, **Alexander I Dyachenko**, Chernogolovka, Moscow , and **Vladimir E Zakharov** (zakharov@math.arizona.edu), Department of Mathematics, Tucson, AZ 85721. *The Tale of Two Branch Points: New Approach to 2D Potential Flows.* Preliminary report.

A potential flow of an ideal fluid with a free surface and infinite depth is considered in 2D. The fluid dynamics can be fully characterized by the motion of a pair of square-root branch points in the analytic continuation of both the conformal mapping and the complex velocity. We derive exact equations describing the evolution of analytic functions defining fluid flow along a cut in complex plane. The equations show that in general case surface remains smooth at all times, new integrals of motion are discovered. A connection to vortex sheet problem is conjectured. Analytical results are supported by numerical simulations. (Received August 30, 2021)