1027-76-124 **Y A Antipov*** (antipov@math.lsu.edu), Louisiana State University, Baton Rouge, LA, **V V Silvestrov**, Gubkin Russian State University of Oil and Ga, Moscow, and **A Y Zemlyanova**, Louisiana State University, Baton Rouge, LA. *Supercavitating flow of a free jet around wedges.*

In the framework of the Tulin model of supercavitating flow, the problem of reconstructing the free surface of a jet and the shapes of the cavities behind two wedges placed in an ideal fluid is considered. The conformal map that transforms a parametric plane with three cuts along the real axis into the triple-connected flow domain is found by quadratures. The use of the theory of Riemann surfaces (the Schottky doubles) enables us to reduce the non-linear model problem to two Riemann-Hilbert problems on a hyperelliptic surface. The solution to the first problem is a rational function. The second problem is solved in terms of singular integrals with the Weierstrass kernel. The essential singularities of the solution at the infinite points of the surface are removed by solving a real analogue of the Jacobi inversion problem on the surface, that is solved in terms of the zeros of the associated Riemann Theta function. The unknown parameters of the conformal map are recovered from a system of certain algebraic and transcendental equations, which is solved numerically.

By modeling the physical flow as a flow on the infinitely-sheeted Riemann surface, we answer to the following question: How long had a jet of fluid been in a cavity before it has been thrown out of it? (Received February 26, 2007)