Dedicated to Professor Ioan A. RUS on the occasion of his 70th anniversary

The free-boundary flow past an obstacle. Qualitative and numerical results

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ABSTRACT. The investigation of the free boundary flow of an ideal fluid past a smooth obstacle is reduced herein to the study of a system of non-linear integro-differential equations. We study the existence and uniqueness of the solution in case that the obstacle is an arc of circle (symmetrical with respect to Ox - axis which is assumed to have the direction of the fluid flow at infinity upstream) and we calculate it numerically by means of the successive approximations method. We also calculate the drag coefficient and the free lines.

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