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# A method of analyzing flow about transom stern in 2-D Neumann-Kelvin problem

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**Summary:** An analytical method in so-called Neumann-Kelvin problem is proposed to represent 2-D flow about semi-displacement type ship having blunt stem and transom stern. At first, the usual Neumann-Kelvin solution, complex potential, is deduced from Green's integral formula by using the boundary conditions on the linearized free surface and on the exact body surface and is represented by the velocity distribution along the body surface and by wave sources located at the fore and aft cross points. This new representation shows explicitly the non-uniqueness of Neumann-Kelvin solutions. Next, the transom wall is removed and the representation is reduced to the sum of integration along the body surface, the unknown being the velocity differences, and the wave source located at the fore cross point. The resulting boundary integral equation has two unkowns which are determined from planning conditions, Kutta velocity condition and the other wave height condition at the transom point. The numerically obtained solutions show good flows around the body with blunt stem and transom stern. It is reported to be able to assess the Froude number when planing starts by combining wave breaker indices, the values of resistance, lift and trim moment when the rise of center of gravity and the trim are varied and the Froude number when heave and pitch are unstable. It is also shown that a concave camber over the bottom of planing hull makes a profit for attitude and resistance. At last, a possibility is suggested to obtain a good evalution of resistance for body with transom stern by using high-speed approximation of inverse mirror solution.