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## Numerical Model of Se, orestrocted Vortex Flows With Peninsula-Shaped Boundary

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patches and fronts evoluattractive area of study in mentionical fluid dynamics. The simulation of vortex flows in med region is under consideration the method of contour dynamics model is proposed to simulate patches in semirestricted reboundary. It is shown that flow evolution observing the m wortex patches boundaries. warmics, vortex flow, ideal in-

mumerical simulation. Let's flow of an ideal incomby the domain D(t) of uwortex patch). The flow be written in the form

$$= G(x,y;\xi,\eta) d\xi d\eta \qquad (1)$$

$$= \frac{1}{4\pi} \ln \frac{(\xi - x)^2 + (\eta - y)^2}{(\xi - x)^2 + (\eta + y)^2} - \ln \frac{(\xi - x)^2 + (\eta + y)^2}{(\xi - x)^2 + (\eta + y)^2}$$

where (x, y),  $(\xi, \eta)$  are coordinates of observation point and integration point respectively, G(x) $y; \xi, \eta$ ) -Green function for the Laplace equation. The velocity vector components u and v may be found from (1) by well known relations

$$u = -\Psi_{\nu}, \nu = \Psi_{\nu}. \tag{2}$$

To construct effective numerical procedure of temporal flow exploration one must rewrite (1) using contour integrating instead of double integrating. In the case of unbounded flow it is easy to make using Green function symmetry with respect to observation and integration points and the Stokes theorem. This paper is dedicated to make contour dynamics algorithm to explore vortex flows in region with peninsula-like boundary (fig. 1). In this case Green function may be written in form where a is the radius of peninsula.

$$= \frac{1}{4\pi} \left[ \ln \frac{(\xi - x)^2 + (\eta - y)^2}{(\xi - x)^2 + (\eta + y)^2} - \ln \frac{\left(\frac{a^2 \xi}{\xi^2 + \eta^2} - x\right)^2 + \left(\frac{a^2 \eta}{\xi^2 + \eta^2} - y\right)^2}{\left(\frac{a^2 \xi}{\xi^2 + \eta^2} - x\right)^2 + \left(\frac{a^2 \eta}{\xi^2 + \eta^2} + y\right)^2} \right]$$
(3)

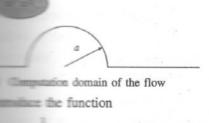
satisfying the identity

$$G = [(\xi - x)F]_{\xi} + [(\eta - y)F]_{\eta}$$
 (5)

Using (5) and the Stokes theorem one can obtain from (1)

$$\Psi(x,y,t) = \omega_0 \int_{\mathcal{C}(t)} F[(\xi - x) d\eta - (\eta - y) d\xi]$$
 (6) where  $C(t)$  is the vortex boundary.

Substituting (3) into (4) and integrating it one can find after some algebra where we used the notation



$$= G[x,y;x+(\xi-x)z,y+(\eta$$
(4)