Modelling of Transport and Mixing across Gulf Stream TATYANA
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Shevchenko University — The new mathematical model for a stream function of a
meandering jet of Gulf Stream is suggested based upon a modification of the von
Kármán vortex street stream function. This stream function allows to approximate
experimentally found by Bower main coherent structure elements of Gulf Stream in
a coordinate frame moving with a speed of the meander: i) an eastward-propagating
meandering jet; ii) regions of fluid recirculation below and above meander crests and
troughs; iii) regions of westward-propagating fluid below and above the jet and re-
circulation regions. The inclusion of eddies above the recirculation regions and the
jet enhance transport and mixing across the jet. Calculations show that more than
one third of the circular area above hyperbolic points may contain warm fluid from a
central area of the jet. To study mixing across the jet we examine deformation of this
circular area back in time, so we can determine from which part of the jet that area
is composed. Contour line tracking method conserving all topological properties in
2-D flows is used for this procedure.

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