

TITLE: Comparación entre los tiempos de residencia calculados por métodos eulerianos y lagrangianos en el estuario mesomareal del Nervión (Puerto de Bilbao)

AUTHOR:

GERMÁN CLAVERO JORNET

TUTOR:

MANUEL ESPINO INFANTES

COTUTOR: MANEL GRIFOLL I COLLS

EXTRACT

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In this work, the water time residence has been computed by means of both a eulerian and a lagrangian approach. The flushing features of Bilbao Harbour, at the meso - tidal estuary of Nervión (Basque Country, Spain) have been incorporated. To accomplish that, a numerical simulation has been carried out using the Regional Ocean Modelling System (ROMS). Following this, a comparative study has been taken.

The improvisation of numerical methods in the engineering field, particularly in maritime engineering, is a fact. A wide range of studies have been carried out using them. This is the case of Cucco et al. (2009), which used a 2D hydrodynamic model of the Venice lagoon to reproduce the tidal forcing. They neglected the wind effect and the diffusive transport processes. In this work, a 3D model has been used taking into account tidal and wind forcing instead.

Lagrangian computation has been carried out neglecting the diffusive transport processes because of the high computational cost needed. On the other hand, eulerian tracer computation has incorporated advective but also difussive dynamics.

The work has been carried in 3 levels of study:

- *Eulerian residence time (TrE) and lagrangian residence time (TrL).* A qualitative study takes place separately of both eulerian and lagrangian residence times.

- *Influence of the tidal variability in the moment of the particles released: flood, high, ebb and low tide.* The variability coefficient has been computed, the quotient between standard deviation and average residence time of the 4 scenarios at the same study point.

- *Residence time in the surface and the bottom of the water mass.* The spatial distribution of the time differences between the two depth layers has been analyzed.