Hydrodyn - FLOSOFT

Environ Software Pvt. Ltd.

AD 2000+ Technology towards BC 2000 Nature

Hydrodyn-FLOSOFT is an advanced software package, with a Graphical User Interface(GUI) consisting of pre-processor, multiple solvers and post processor that can simulate the hydrodynamic properties of the flow in rivers, seas and coastal waters of estuarial systems in a complex geometry with high precision using higher order numerical schemes.

Hydrodynamic modeling is the basic requirement for studying the flow properties in the region of interest. Based on the analysis, surges, waves can be predicted and the suitability of effluent discharge, sediment dumps, sediment particle discharge and ship navigation can be predicted.
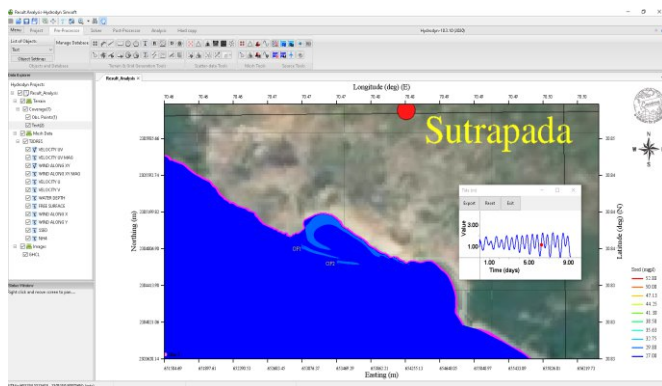
Hydrodyn- FLOSOFT includes many specialized features of graphics and menu driven pre/post processor for setting up the input, running the calculation, and selecting and obtaining graphical output from the analysis, animation facilities, trajectory plots etc. It allows fast, flexible creation and modification of computational models to reduce the possibility of errors in the input. It is available for Unix/Linux and Windows operating systems.

GRAPHICAL USER INTERFACE FEATURES

Hydrodyn-FLOSOFT provides interactive Graphical User Interface (GUI) which guides the user for defining topography, boundary locations, defining meteorological data options and preparing data base for ports, bridges and jetty constructions, selecting options for grid generation, specifying model parameters, selecting physical models, properties, boundary conditions and solvers, initialising the solver parameters, setting up solution controls, running the solvers, animation facilities, hard copy utilities and extensive on-line help facilities.

Post Processor assists the user for display of solver output results graphically. GUI options are available for plotting of contour maps and color maps of model properties, simulation results such as water elevations, pollutant concentrations, flux variation at different locations, plotting of flow velocity vectors , computational grid, residual velocities, time history plots, spill trajectory plots, animation facilities, setting background colors of pre and post processor screens etc.GUI's Hard copy utilities helps the user to save the image pictures in standard formats. Online Help facility is also available in the GUI. This guides the user to help out in various stages in the preparation of input data and setting up the software.

GEOMTERY AND MESH SYSTEM

Hydrodyn-FLOSOFT interface is built on Triangular grid generation module based on Advanced Front Technique which contains a logical menu interface that guides the user to generate the grid for complex domain shapes. The user can control the grid spacing in selected regions of the domain of study. Constant grid spacing, and spatially varying grid spacing options are also available while generating mesh.
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SOLVER FEATURES

Hydrodyn-FLOSOFT uses Finite Element Method to solve the Navier-Stokes and scalar advective-diffusive equations on Triangular grid system for prediction of hydrodynamics. FLOSOFT has both explicit/implicit solvers for solving the basic governing equations of flow. Various modules including hydrodynamic, salinity and temperature models have been integrated into FLOSOFT.

Hydrodyn-FLOSOFT uses Lagrangian discrete parcel algorithm to solve the governing equations of water quality transport.

♦ Uses the Finite Element approach, which allows modeling in 1, 2 or 3 dimensions.
♦ Solves equations for conservation of mass, momentum and energy for flow and immiscible pollutants.
♦ Solves for velocities and water elevations in open surface flows and includes models for density variation.
♦ Uses 3D triangular grid so that the simulation can be done for any arbitrary shaped topography of flow domains.
♦ Has its own Grid Generator, which is based on Advanced Front Technique.
♦ Uses sigma-coordinate system vertically, so that the irregular bottom topography of the estuarine bed can be studied more accurately.
♦ The user can select the boundary conditions at any location and select any type of boundary condition i.e. steady or transient.
♦ A graphical interface i.e. pre-processor is integrated to the model to define the required model inputs graphically.
♦ Various objects, i.e. bathymetric depth contours, islands, dykes, coastlines, etc. are represented by different colors to identify the objects easily.
♦ Interactive GIS data management system.
♦ The solver has options to continue the pollutant computations alone after converging the flow field.
♦ The observation points can be selected at any location in the computational domain to monitor the output results and show the results graphically.
♦ Input winds time series.
♦ Display GIS resources affected by the oil trajectory.
♦ The GIS utility is highly interactive and allows the user to enter, or import from external GIS sources, a variety of geographic data such as response resources, environmentally sensitive areas, and key coastal features.
♦ It has animation facility for output results of various file formats i.e. Bitmap, JPG, PNG.
♦ Dispersant effectiveness and over-flight update tools.

SOFTWARE CAPABILITIES

♦ This software is flexible and can be used for any geographical locations in the world.
♦ It can be used to simulate slick trajectories in tidal and non-tidal flow domains.
♦ It uses a 3D triangular grid to map the physical domain features to be modeled exactly and with generalized flow boundary conditions
♦ It includes many specialized features of graphics and menu driven pre/postprocessor for setting up the input, running the calculation, and selecting and obtaining graphical output from the analysis
♦ It allows fast, flexible creation and modification of computational models, while greatly reducing the possibility of errors in the input

Some of the core features are mentioned below

♦ Digitization of the raster images using .dxf files and .xyz files.
♦ Drawing the coastal boundaries, triangular mesh generation with mesh refinement in selective region.
♦ Applying the bathy using scatter points.
♦ Saving the domain in binary format which reduces the size of memory compared to ascii format files.
♦ Defining the boundary conditions and applying the tides and wind for boundary condition.
♦ Finite Element Method solving technics which involves fast computation and produces more accurate results.
♦ Displays the contours, vectors while simulation goes on.
♦ Saving the flow and trajectory result in binary format.
♦ Loading of huge result files takes less time compared to loading of ASCII files.
♦ Plotting, extracting and saving of Time dependent results at selected observation points.
♦ Capable of producing results in PNG format and saving.
♦ Producing animation of velocity contours and vectors.

SOFTWARE APPLICATIONS

Hydrodyn-FLOSOFT covers the following model applications

♦ Intake and Outfall modelling.
♦ Provide first order guidelines in the use of dispersant and help develop dispersion strategies around coastline.
♦ Perform risk assessments for important resources e.g. beaches, fisheries, marine life, protected coastlines and industrial water intakes etc.
♦ Protection and prevention strategies.
♦ Environmental Audits.
♦ Training courses.
♦ Optional capability to customize a resource and cost management system.

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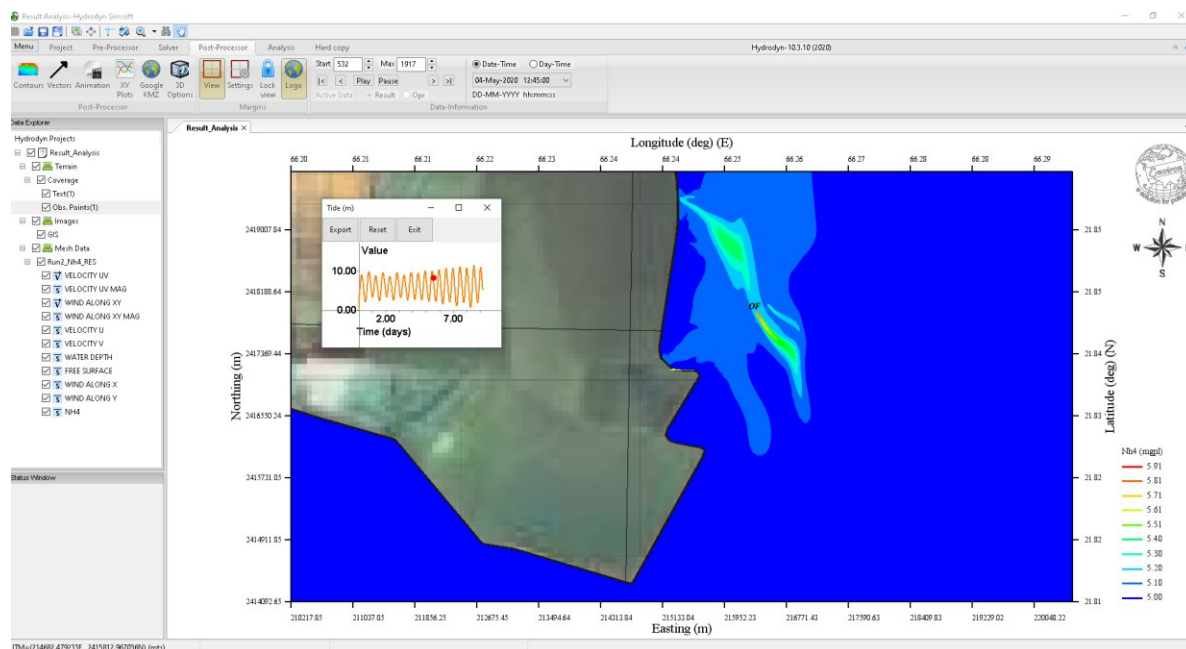
OUR SCIENTIFIC SOFTWARE PRODUCTS

AIRSOFT : Simulation of pollutants spread in atmosphere.
FLOSOFT : Simulation of flow
STMSOFT : Simulation of Solute transport, Biodegradation, chemical Reaction processes in Ground Water flow system
NSPSOFT : Simulation of Noise Pollution
OILSOFT : Simulation of fate and trajectory of oil spills
POLSOFT : Simulation of Conservative and Non- Conservative Pollutant Transport

SURGSOFT : Simulation of surges due to cyclones
SEDSOFT : Simulation of Cohesive and non- Cohesive Sediment Transport
AHDSOFT : Analysis of Hydrographic Data For Tidal Management Practice
**LIBSOFT** : Library Management System
e-Institute : institutional Management System Software
e-Breeze : Office Automation Software

SOME OF OUR CLIENTS

- Adani Port Limited, Hazira
- Bharat Petroleum Corporation Limited, Mumbai.
- British Gas Mumbai
- Cairn India Limited, Noida
- Cairn Lanka Pvt Ltd (CLPL), SriLanka
- Chennai Petroleum Corporation Ltd., Chennai
- Coastal Energen Pvt Ltd (Energen), Chennai
- Department of Ocean Development (DOD), Chennai
- Dhabol Power Corporation, Dhabol
- DMCC Oil Terminals (Navalakhi) limited, Gujarat
- Dubai port, Mina, Jabal Ali, United Arab Emirates
- Eco Chem Sales and Services-Surat, Gujarat
- Essar Oil Limited, Refinery Division, Jamnagar
- Gujarat Maritime Board ,Gujarat
- Gujarat State Pollution Control Board, Gujarat.
- Gujarat Adani Ports, Katch, Gujarat
- Hindustan Petroleum Corporation Limited, Visakhapatnam

- IOCL ,Port Blair, Andaman, Kolkata
- Indian Oil Corporation, Vadinar
- IPSHEM, Oil and Natural Gas Commission(ONGC), GOA
- Indian Oil Corporation Limited, Pipelines Division, NOIDA
- Jindal Shipyard Limited, Mumbai
- Lift and Shift Private Limited, Mumbai
- Reliance Industries Limited, Mumbai
- National Institute of Oceanography (NIO), GOA and its Regional Centers in Mumbai, Cochin and Visakhapatnam
- National Institute of Ocean Technology(NIOT), Chennai
- Surat Municipal Corporation, Surat
- Terra Firma Pvt. Ltd., Goa
- Trimex Heavy Minerals Pvt Ltd., Srikakulam, AP
- Vadinar Oil Terminal Limited, (VOTL), Jamnagar
- Vimta Labs, Hydrebad
- Walchandnagar Industries Limited, Dahej.
- Indian Institute of Technology (IIT), Delhi
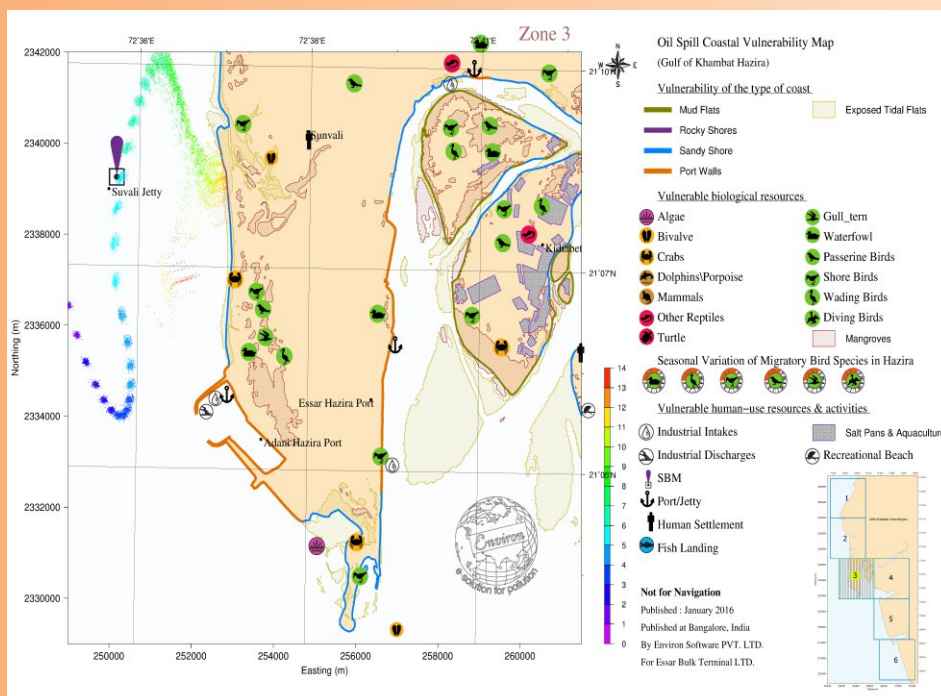
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