



Hydrodyn-WAVESOFT



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Hydrodyn-WAVESOFT

Hydrodyn-WAVESOFT is an advanced software package, with a Graphical User Interface (GUI) consisting of pre-processor, multiple solvers and post processor that can simulate waves in seas and coastal waters of estuarial systems in a complex geometry with high precision using higher order numerical schemes. WAVESOFT provides rapid predictions of water elevation in any meteorological and hydrological conditions. It includes user friendly graphical interface for entering both wind and hydrological data.

Hydrodyn-WAVESOFT 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.

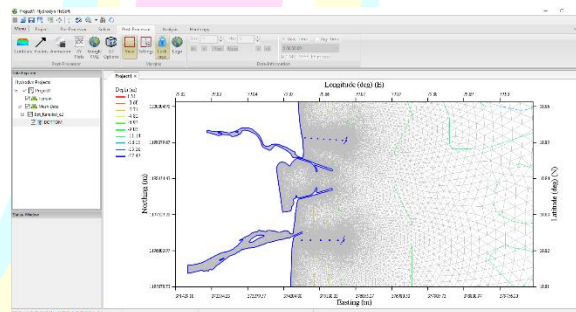
GRAPHICAL USER INTERFACE FEATURES

Hydrodyn-WAVESOFT provides interactive Graphical User Interface (GUI) which guides the user for defining topographical features, specifying boundary locations, defining meteorological data options, selecting options for grid generation, specifying model parameters, selecting physical models, properties, boundary conditions and solvers, initializing the solver parameters, setting up solution controls, running the solvers, on-line animation facilities, hard copy utilities and extensive on-line help facilities.

Post Processor assists the user for display of solver output results graphically in various formats. GUI options are available for plotting of contour maps and color maps of model properties, simulation results such as water elevations, plotting of flow velocity vectors, computational grid, residual velocities, time history 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 and to export software results to ASCII text files supported by virtually any 3D visualization software. 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.

GEOMETRY AND MESH SYSTEM

Hydrodyn-WAVESOFT 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.



SOLVER FEATURES

Hydrodyn- WAVESOFT uses Finite Element Method to solve the Navier-Stokes and scalar advective-diffusive equations on Triangular grid system for prediction of hydrodynamic variables. WAVESOFT has both explicit/implicit solvers for solving the basic governing equations of flow and wave in a coupled way.

Hydrodyn-WAVESOFT models the sea states by solving the balance equation of the action density directional spectrum. To serve that purpose, the model should reproduce the evolution of the action density directional spectrum at each node of a spatial computational grid. In **WAVESOFT** the wave directional spectrum is split into a finite number of propagation frequencies and directions. The balance equation of wave action density is solved for each component.

- Wave Climate Forecasting
- Coastal morpho dynamics
- Probability of floods in coastal zone
- Coastal structure stability and coast protection
- Assimilation of wind or wave satellite data during computation
- Hindcasting of exceptional events having severely damaged maritime structures
- Wave-currents and wave-storm surge interactions, especially in those places where tide plays a significant role
- The oceanic domain, characterized by large water depths, i.e. by relative water depths of over 0.5 The dominant physical processes are: wind driven waves, whitecapping dissipation and non-linear quadruplet interactions.
- The continental seas and the medium depths, characterized by a relative water depth ranging from 0.05 to 0.5. In addition to the above processes, the bottom friction, the shoaling (wave growth due to a bottom rise) and the effects of refraction due to the bathymetry and/or to the currents are to be taken into account.



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- The coastal domain, including shoals or near-shore areas (relative water depth lower than 0.05). For these shallow water areas, such physical processes as bed friction, bathymetric breaking, non-linear triad interactions between waves should be included. Furthermore, it could be useful to take into account the effects related to unsteady sea level and currents due to the tide and/or to the weather-dependent surges.

SOFTWARE CAPABILITIES

This software is flexible and can be used for any geographical locations in the world

- It can be used to wave 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 wave 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

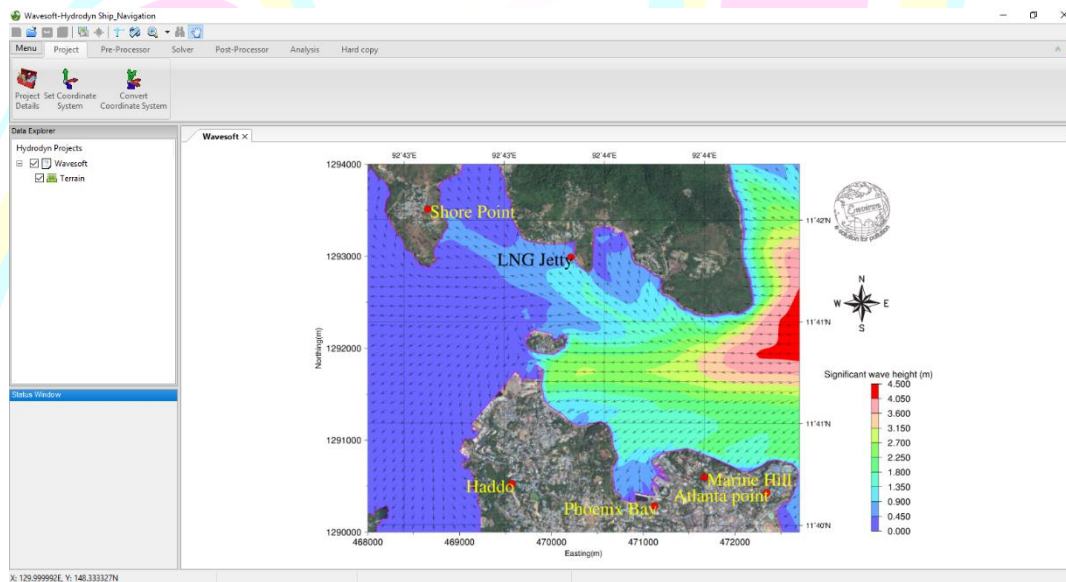
SOFTWARE APPLICATIONS

Hydrodyn-WAVESOFT covers the following model applications

- To establish the tranquility conditions prevail at the Jetty facility
- To assure the currents and tides around the jetty berths are well within threshold limits applicable for safe berthing of vessels 90% of the time.

OUR SCIENTIFIC SOFTWARE PRODUCTS

Airsoft	: Simulation of pollutants spread in atmosphere.
Flosoft	: Simulation of Hydrodynamic flow
Stmsoft	: Simulation of Solute transport, Biodegradation, Transport chemical Reaction processes in Ground Water flow system
Nspsoft	: Simulation of Noise Pollution Management Practice
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
Ahdsoft	: Analysis of Hydrographic Data For Tidal
Libsoft	: Library Management System
Wavesoft	: Simulation of water elevation due to wave
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), Sri Lanka
- Chennai Petroleum Corporation Ltd., Chennai
- Coastal Energen Pvt Ltd (Energen), Chennai
- Department of Ocean Development (DOD), Chennai
- Dhabol Power Corporation, Dhabol
- DMCC Oil Terminals (Navlakhi) 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
- 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, Kakinada
- 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, Hyderabad
- Walchandnagar Industries Limited, Dahej