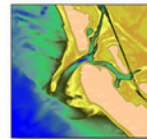


CIRP MISSION

- Reduce O&M costs at coastal navigation projects
- Develop tools to support O&M practice
- Transfer technology and products

Jeff McKee, HQ Navigation Business Line Manager
 Jeff Lillycrop, Technical Director
 Eddie Wiggins, Associate Technical Director



Point of Contact:

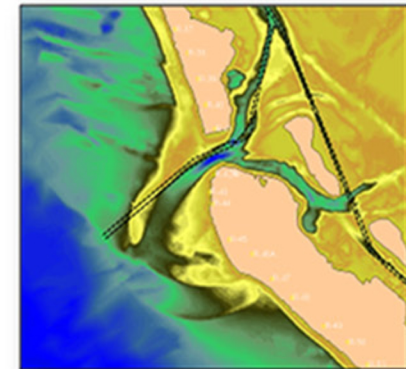
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 Program Manager, CIRP
 Julie.D.Rosati@usace.army.mil
 251-694-3719, 601-634-3005

Visit the CIRP Website:
<http://cirp.usace.army.mil>

CIRP Wiki:
<http://cirp.usace.army.mil/wiki/Main>

CIRP

Numerical Model Tools and Capabilities

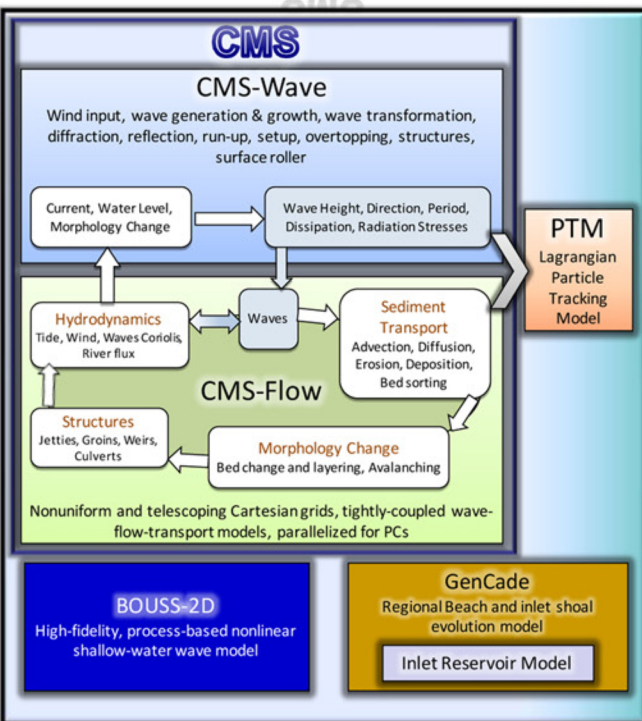


U.S. Army Engineer Research and Development Center
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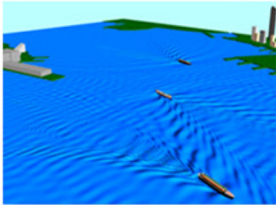
advancing inlet science & engineering



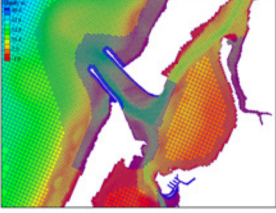
numerical model tools and capabilities

numerical model tools and capabilities

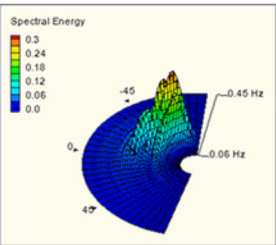
Bouss-1D/2D



CMS-Flow



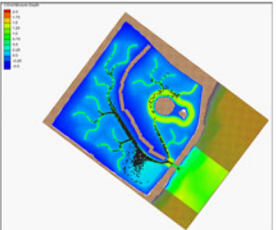
CMS-Wave








GenCade



Particle Tracking Model



Model	What does it do?	What are typical time scales and platforms?	Where has it been validated?	What are advantages?	What are limitations?	Where do I find info?	Who is the main POC?
Bouss-1D/2D <i>Wave model for navigation, port/harbor, flood & risk assessment; decision-support</i>	<ul style="list-style-type: none"> High-fidelity, advanced, most accurate model for short and long waves 1-10 km regions Wave-structure-ship interactions, ship wake Surf & swash zone waves (rip currents, runup/over-topping, infra-gravity & tsunamis) 	<ul style="list-style-type: none"> 20 wave conditions run with rectangular grids in projects Can be used with one grid or grids for each project alternative Runs on PC, Linux, and HPCs (supercomputers) Hours to a week 	<ul style="list-style-type: none"> 15+ sites including coastal inlets, harbors, ports, flood control structures, and reefs 	<ul style="list-style-type: none"> Physics & process based; no empiricism Only DoD model for nonlinear shallow-water waves Ideal for ports/harbors/marinas, & design/rehab of infrastructure 	<ul style="list-style-type: none"> Need expertise to run Time-consuming Not necessary for all coastal problems No winds No unstructured-grid capability 	 <ul style="list-style-type: none"> CIRP, NavSys, FDR, SWIMS websites Knowledge Hub (KH) 	Dr. Zeki Demirbilek
CMS-Flow <i>2D, depth-integrated</i>	<ul style="list-style-type: none"> Tidal flow, wave-induced currents, sediment transport, and morphology change Integrated with CMS-Wave 	<ul style="list-style-type: none"> Runs on multi-core desktop machines Typical simulation lengths of several months to years 	<ul style="list-style-type: none"> 20+ sites including coastal inlets, estuaries and beaches 	<ul style="list-style-type: none"> Integrated system Robust and fast Flexible Cartesian meshes SMS interface User-friendly 	<ul style="list-style-type: none"> Depth-integrated No boundary fitting capability No swash zone or cross-shore sed transport (yet) 	 <ul style="list-style-type: none"> CIRP website KH 	Dr. Honghai Li, Dr. Chris Massey
CMS-Wave <i>2D, depth-integrated</i>	<ul style="list-style-type: none"> Full-plane spectral wave generation-transformation Integrated with CMS-Flow Designed for inlet applications 	<ul style="list-style-type: none"> Runs on PC in SMS, DOS Typical simulation lengths of several months to years 	<ul style="list-style-type: none"> 20+ sites: US East and West coasts, Gulf of Mexico 5+ laboratory and theoretical studies 	<ul style="list-style-type: none"> Efficient SMS interface Theoretical-based wave diffraction, reflection Includes structure-wave interactions 	<ul style="list-style-type: none"> Empirical wave breaking formula Structured grid 	 <ul style="list-style-type: none"> CIRP website KH 	Dr. Lihwa Lin, Dr. Zeki Demirbilek
GenCade <i>1D regional beach and inlet shoal evolution model</i>	<ul style="list-style-type: none"> Can represent coastal structures, beach fills, dredging and placement Includes Inlet Reservoir Model* to account for inlet shoal and channel evolution *Also available in PC version 	<ul style="list-style-type: none"> Runs on PC in SMS Years to multiple decades Wave conditions representing 1-10 years 	<ul style="list-style-type: none"> Basic V&V completed 5+ sites: Onslow Bay, NC; Sargent Beach, TX; St. Johns County, FL; Point Lookout, NY 	<ul style="list-style-type: none"> User-friendly; easy to learn Conceptual model = fast grid creation and set up Integrates cumulative projects Fast 	<ul style="list-style-type: none"> Empirically-based sand transport Explicit solution scheme (solution stability) Constrained by standard 1-line model assumptions 	 <ul style="list-style-type: none"> CIRP website KH 	Ashley Frey
PTM <i>Particle Tracking Model, for 2D/3D hydro models</i>	<ul style="list-style-type: none"> Joint DOER-CIRP product Coupled to CMS by CIRP Predicts particle transport pathways and fate SMS based interface 	<ul style="list-style-type: none"> Accepts input from CMS and other hydro and wave models Runs on desktop PCs and HPCs (super-computers) Seconds to hours 	<ul style="list-style-type: none"> Basic V&V completed Detailed V&V studies in progress 	<ul style="list-style-type: none"> Fast and efficient Flexible; not tied to any hydro or wave model SMS interface connects to flow and wave models 	<ul style="list-style-type: none"> Not designed for sediment transport calcs Some empirical formulas Too many particles can slow runtimes 	 <ul style="list-style-type: none"> CIRP, DOER websites KH 	Drs. Tahrih Lackey (DOER), Honghai Li (CIRP), Zeki Demirbilek (CIRP & DOER)