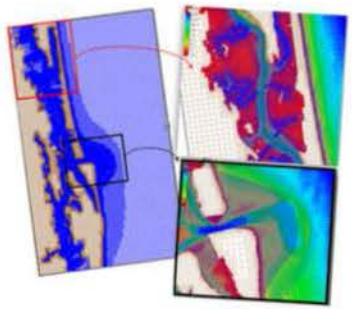

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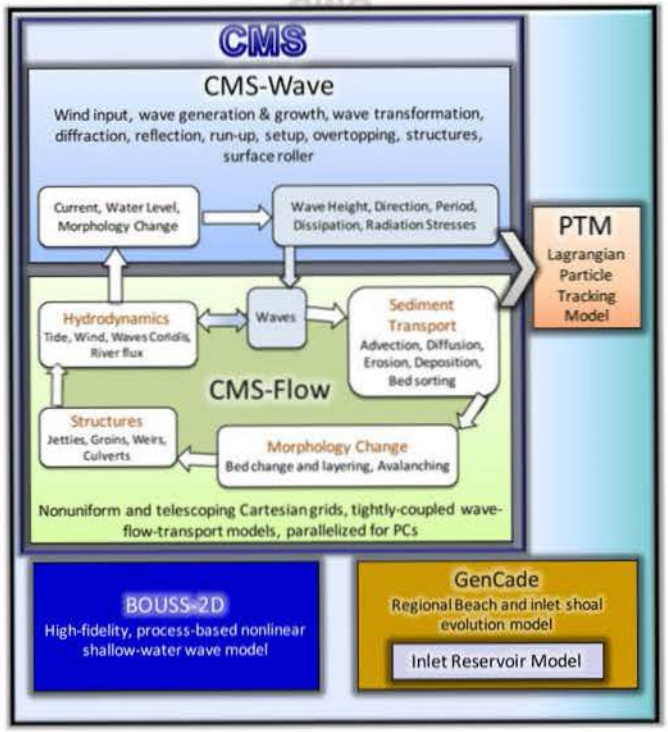

CIRP MISSION

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

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http://cirp.usace.army.mil

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

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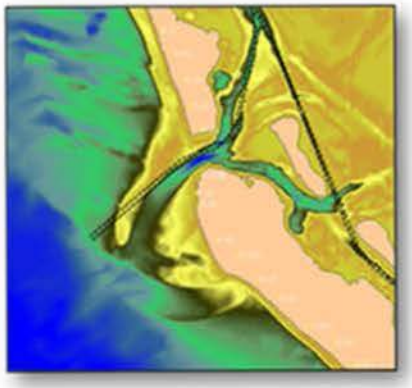
CIRP

Numerical Model Tools and Capabilities



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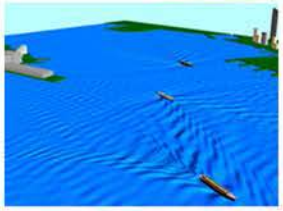
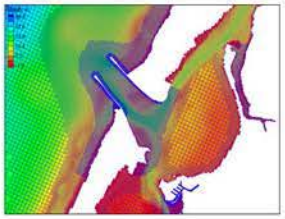
numerical model tools and capabilities

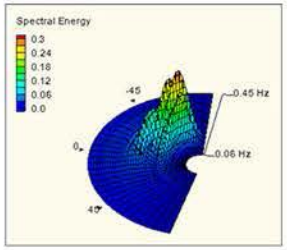
Bouss-1D/2D



CMS-Flow

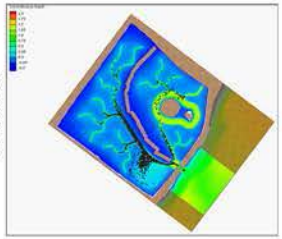


CMS-Wave



GenCade

Particle Tracking Model



numerical model tools and capabilities

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 *Wave model for navigation, port/harbor, flood & risk assessment; decision-support*	• 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)	• 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	• 15+ sites including coastal inlets, harbors, ports, flood control structures, and reefs	• Physics & process based; no empiricism • Only DoD model for nonlinear shallow-water waves • Ideal for ports/ harbors/marinas, & design/rehab of infrastructure	• Need expertise to run • Time-consuming • Not necessary for all coastal problems • No winds • No unstructured-grid capability	• CIRP, NavSys, FDR, SWIMS websites • Knowledge Hub (KH)	Dr. Zeki Demirbilek
CMS-Flow *2D, depth-integrated*	• Tidal flow, wave-induced currents, sediment transport, and morphology change • Integrated with CMS-Wave	• Runs on multi-core desktop machines • Typical simulation lengths of several months to years	• 20+ sites including coastal inlets, estuaries and beaches	• Integrated system • Robust and fast • Flexible Cartesian meshes • SMS interface • User-friendly	• Depth-integrated • No boundary fitting capability • No swash zone or cross-shore sed transport (yet)	• CIRP website • KH	Alex Sanchez
CMS-Wave *2D, depth-integrated*	• Full-plane spectral wave generation-transformation • Integrated with CMS-Flow • Designed for inlet applications	• Runs on PC in SMS, DOS • Typical simulation lengths of several months to years	• 20+ sites: US East and West coasts, Gulf of Mexico • 5+ laboratory and theoretical studies	• Efficient SMS interface • Theoretical-based wave diffraction, reflection • Includes structure-wave interactions	• Empirical wave breaking formula • Structured grid		Dr. Lihwa Lin
GenCade *1D regional beach and inlet shoal evolution model*	• 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*	• Runs on PC in SMS • Years to multiple decades • Wave conditions representing 1-10 years	• Basic V&V completed • 5+ sites: Onslow Bay, NC; Sargent Beach, TX; St. Johns County, FL; Point Lookout, NY	• User-friendly; easy to learn • Conceptual model = fast grid creation and set up • Integrates cumulative projects • Fast	• Empirically-based sand transport • Explicit solution scheme (solution stability) • Constrained by standard 1-line model assumptions	• CIRP website • KH	Ashley Frey
PTM *Particle Tracking Model, for 2D/3D hydro models*	• Joint DOER-CIRP product • Coupled to CMS by CIRP • Predicts particle transport pathways and fate • SMS based interface	• Accepts input from CMS and other hydro and wave models • Runs on desktop PCs and HPCs (super-computers) • Seconds to hours	• Basic V&V completed • Detailed V&V studies in progress	• Fast and efficient • Flexible; not tied to any hydro or wave model • SMS interface connects to flow and wave models	• Not designed for sediment transport calcs • Some empirical formulas • Too many particles can slow runtimes	• CIRP, DOER websites • KH	Drs. Tahirih Lackey (DOER), Honghai Li (CIRP), Zeki Demirbilek (CIRP & DOER)