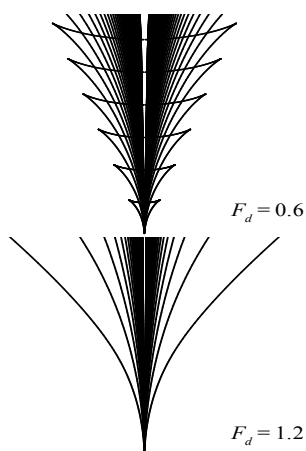
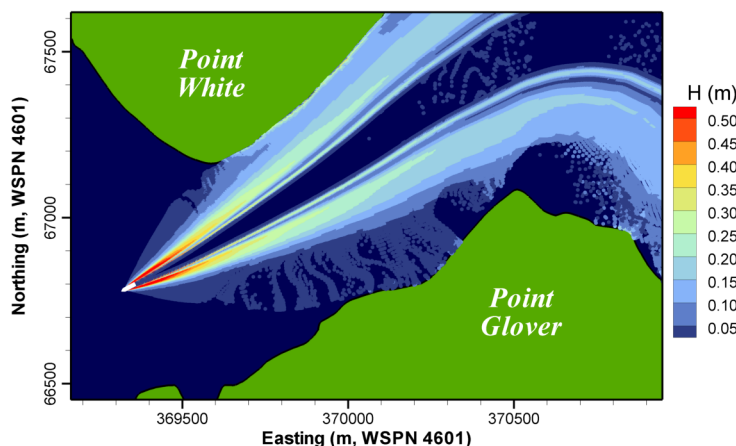
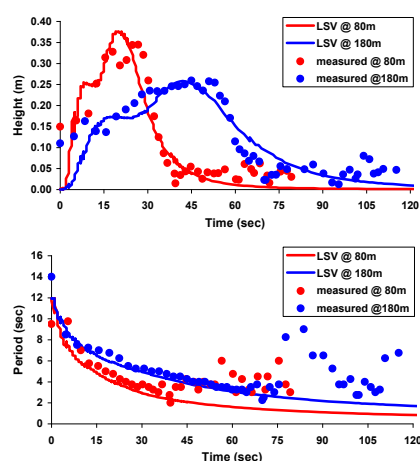




Wake patterns generated by a sub-critical (top) and super-critical (bottom) vessel in deep water



Comparison of measured and computed wake height and period for a 150-passenger fast ferry

LAGRANGIAN SUPER-CRITICAL VESSEL (LSV) MODEL

High-speed vessels, especially fast ferries, are now common throughout the world. These vessels are capable of producing substantial wakes that can be damaging to adjacent shorelines and infrastructure, and dangerous to other users of the waterway. Coldwater Consulting Ltd. has developed a new computer model, the Lagrangian Super-critical Vessel (LSV) model, capable of predicting the generation of wakes from high-speed vessels and the transformation of those wakes by currents and bathymetry.

The wake produced by a high-speed, or super-critical, vessel is different from that produced by a vessel moving at a sub-critical speed. A sub-critical vessel produces a wake pattern with both diverging and transverse components. Once super-critical, the transverse component of the wake is shed, leaving only the diverging wake.

The LSV model predicts the generation and propagation of wakes from high-speed vessels traveling at both sub- and super-critical speeds. The model simulates transformation processes such as current and depth refraction, shoaling, breaking and wake train dispersion. Variable vessel routing and speed, as well as irregular domain geometry and bathymetry can be handled. The Lagrangian structure of the numerical solution provides efficient solution for large areas and numerous simulations.

The LSV model has been applied and validated in a number of engineering studies throughout North America, with vessels ranging from foil-supported catamarans, to high-speed monohulls, to planing pleasure craft.

LSV model simulations can be used directly to assess wake impacts, or can be used as input into sediment transport or beach evolution models to determine vessel impacts on the shore.