River Hydrodynamics Model INSPERT

Integrated Numerical research System
for Prevention and Estimation of River disasTer

● **Organization**	ECOH CORPORATION
● **Department**	Environmental and Hydraulic Engineering Department
● **Presenter**	Hidenori SHIBAKI
● TEL/FAX/ e-mail	TEL +81-3-5828-2173 / FAX +81-3-5828-2176 / e-mail shibaki@ecoh.co.jp

INTRODUCTION

River Hydrodynamics Model INSPERT analyzes hydraulic processes at the estuaries and tidal compartments of rivers with numerical simulation. Transformations of storm surge and waves in the estuaries, and storm surge run-up and wave propagation into tidal compartments are predicted. Wave run-up on and overtopping of river embankments, that are combined hydraulic processes of tide, storm surge and wave, are estimated.

INSPERT composed of several sub-models is a useful tool for planning and design of river embankments.

DEVELOPMENT PROCESS

A sub-model, Storm Surge model, has been developed for numerical studies on several coasts in bay areas and at river mouth areas. This model gives an accurate estimate of storm surge level by incorporating the effect of wave setup on tidal flats around river mouths.

Another sub-model for wave transformation, PEGBIS, is based on Parabolic Equation with Gradational Breaker Index for Spectral waves, which has been verified with several data of field observations and laboratory experiments. This model provides detailed information on wave height variations by random wave breaking on tidal flats around river mouths.

KEY POINTS

Key points of River Hydrodynamics Model INSPERT

●Storm Surge model

Storm Surge model calculates storm surge level accurately by incorporating several effects such as:

*Multi-level flows　*Density stratification　*Wave setup　*River discharge　*Inundation

●Wave transformation model (PEGBIS)

PEGBIS calculates the change of wave height distributions by incorporating several effects such as:

*Wave transformation (Refraction, Diffraction, Shoaling)　* Gradational wave breaking
*Bottom friction　*Directional wave spectrum

●River flow model

River flow model incorporates several effects such as:

*Presence of flood plane　*Unsteady flow　*Concurrence of flood and storm surge
*Nonlinear dispersive waves

●Wave run up

Wave run up heights are estimated with an improved virtual gradient method.

APPROVAL/CREDITABILITY

ECOH CORPORATION is continuing to verify the quality of INSPERT models.
Several papers have been published in Proceedings of Coastal Engineering, JSCE.

Graphical Outputs with River Hydrodynamics Models INSPERT

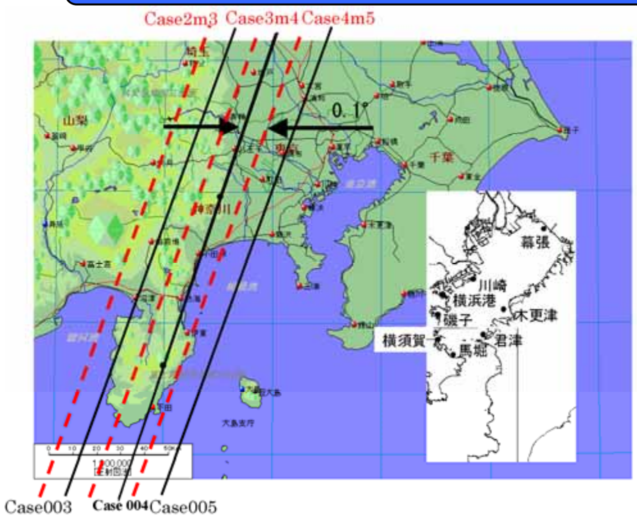


Fig.1 Typhoon routes to predict tide level anomaly around rivers in Tokyo Bay

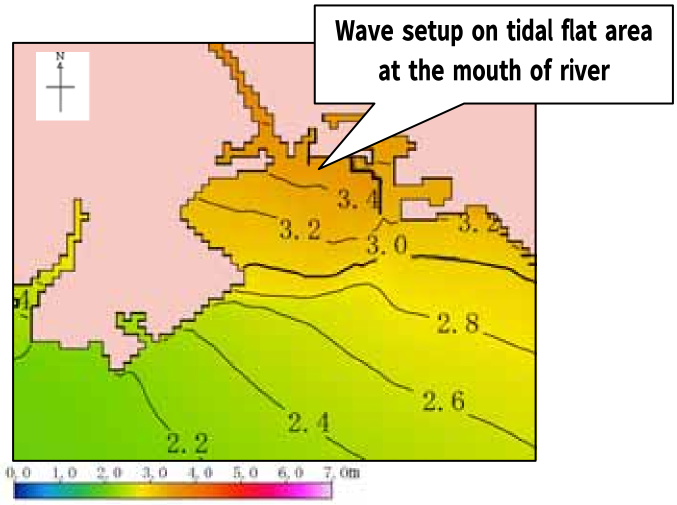


Fig.2 Spatial distribution of maximum tide level anomaly by storm surge

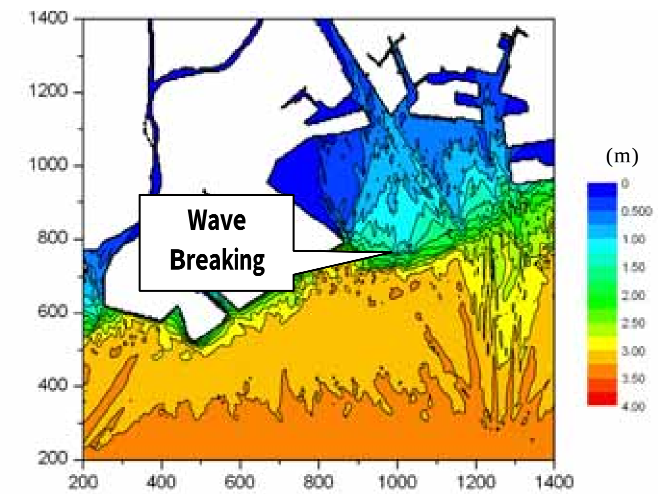


Fig. 3 Spatial distribution of significant wave height around the mouth of river

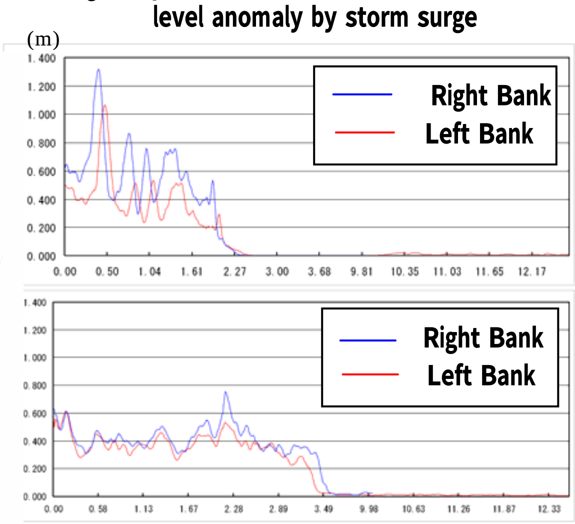
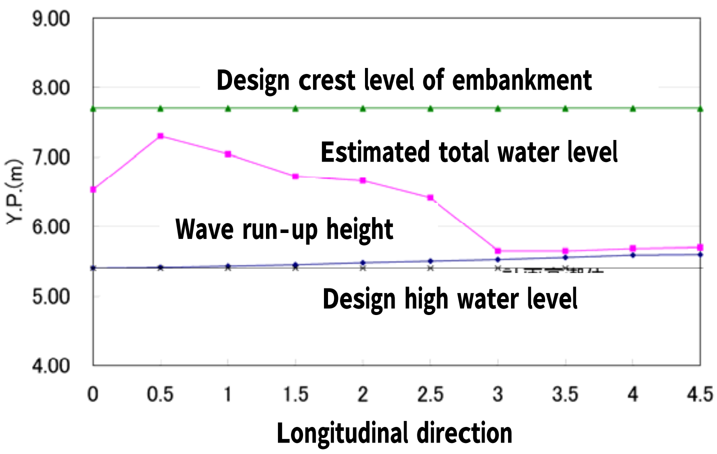


Fig.4 Longitudinal distribution of significant wave height along the river



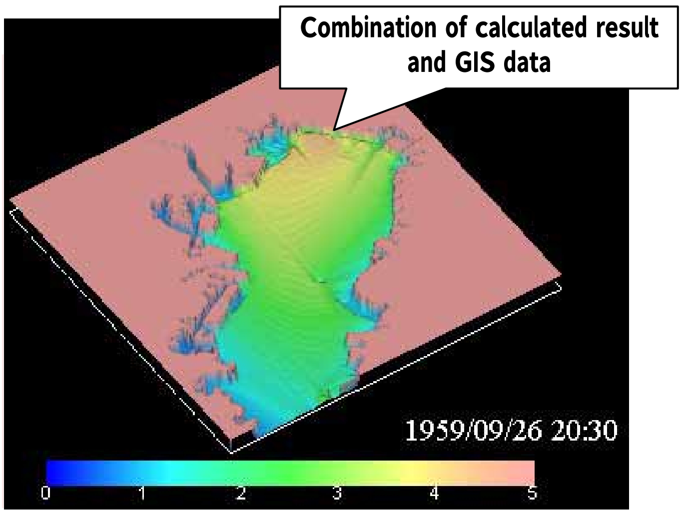


Fig.5 Wave run-up height and estimated total water level in the longitudinal direction

Fig.6 3D-CG of storm surge simulation