

# 3D Environmental Impact Assessment 三維環境影響評估

## Online hydro-environmental modeling and visualization system for public engagement

可供公眾參與的水環境模擬可視化系統

Quantitative environmental impact assessment plays an important role in the sustainable development of our coastal and marine resources. It is often necessary to predict the impact of development projects or pollution discharges and the associated environmental risks in the receiving water. Our objective is to develop a cutting-edge real time GIS-based and integrated 3D virtual reality (VR) hydro-environmental modeling system. The unique technology will enable: (i) Robust and seamless 3D environmental impact prediction from near to the far field; (ii) Full integration with GIS data and advanced visualization capability; (iii) An educational tool to introduce concepts of pollutant mixing and transport; (iv) Effective communication and public engagement.

我們的目標是開發一個結合實時地理訊息系統(GIS)和三維虛擬現實(VR)的水環境管理系統。這個系統提供了以下功能：(i)預測近場到遠場的三維環境影響；(ii)與地理訊息系統結合的數據可視化；(iii)介紹污染物混合和輸送概念的教育軟件；(iv)支持公眾參與的互聯網平台。

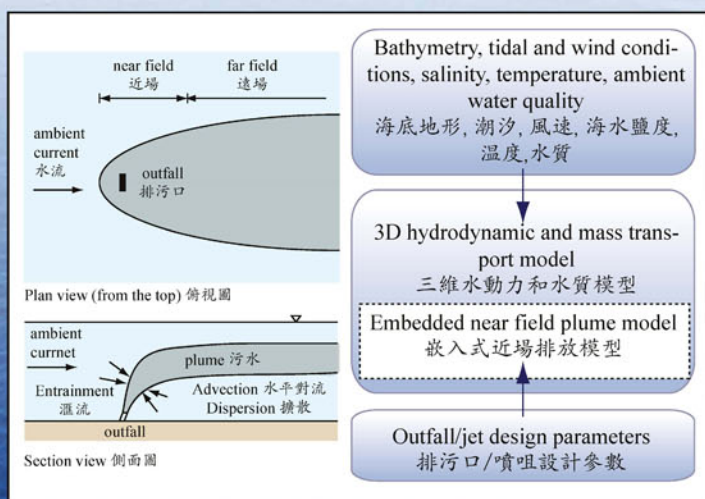
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There are two major components in our system: (i) a unique 3D hydrodynamic model with a fully embedded near field plume model VISJET - using a Distributed Entrainment Sink Approach (DESA); and (ii) the visualization of the simulations and predictions with GIS integrated 3D virtual reality.

Environmental and engineering professionals as well as the general public can easily visualize and navigate around the landmarks and sensitive receivers when assessing the impact of a proposed project or polluting discharge. The system provides a platform for the public to offer comments and suggestions interactively.

這個系統包含兩個主要組件：(i)一個基於「分散滙流」(DESA)方法並結合近場射流模擬軟件(VISJET)的三維流體動力模型；(ii)一個與GIS融合的三維虛擬現實的可視化系統。

專業人士以及公眾均可以透過系統方便地檢視模型預測結果。我們亦會設立一個互動平台讓公眾能夠為環境影響評估提供意見。



Dynamic coupling of near- and far-field models of an outfall discharge  
污水排放模擬中近場及遠場的動態耦合

### GIS-based 3D visualization 基於GIS的三維可視化系統

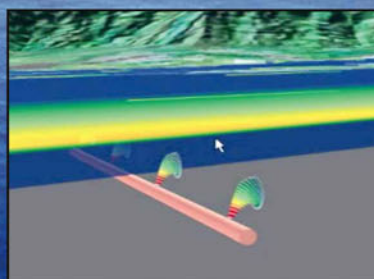
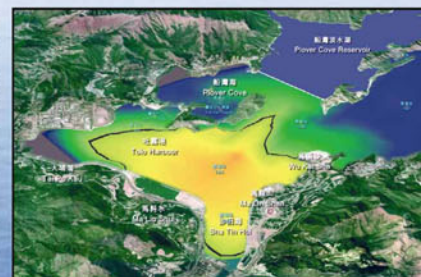
The visualization of the predictions of the 3D modeling engine is fully integrated with the GIS information. The technology involves data visualization, geometric modeling and real-time rendering based on dynamic scheduling of multi-resolution data with smooth transition between different resolution levels.

我們的系統完整地結合了數學模擬數據的三維可視化和地理訊息系統。此技術涉及科學數據可視化、地形建模和動態多分辨率數據的實時顯示。



3D virtual reality with flexible and intuitive navigation and visualization of simulation data. 具有靈活和簡便導航技術的三維虛擬現實和模擬數據可視化

Standard threshold concentration contours are used to indicate affected areas. 用標準等濃度線來表示受影響地區



Near- and far-field interaction modelled by the VISJET/DESA system  
模擬得出的近場和遠場相互作用