

國科會補助專題研究計畫項下出席國際學術會議心得報告

日期：103年04月18日

計畫編號	NSC 101-2628-E-006 -019 -MY2		
計畫名稱	水下山崩土石流模型之探討(2/2)		
出國人員姓名	戴義欽	服務機構及職稱	成功大學 水利及海洋工程學系 副教授
出國時間	103年04月13日 至 103年04月17日	出國地點	Sendai, Japan (仙台, 日本)
會議名稱	APACM Thematic Conference & IACM Special Interest Conference COMPSAFE 2014 1st International Conference on Computational Engineering and Science for Safety and Environmental Problems		
發表論文題目	(英文) A Hybrid Method for Simulating Hazardous Flows over Non-Trivial Topography		

一、參加會議經過

The “COMPSAFE 2014 — 1st International Conference on Computational Engineering and Science for Safety and Environmental Problems” is a new APACM Thematic Conference organized by the Japan Association for Computational Mechanics (JACM), the Japan Society for Computational Engineering and Science (JSCES), and International Research Institute of Disaster Science, Tohoku University. The conference is held during 13-16 April 2014 at Sendai International Center, Sendai, Japan. In this conference, there are more than 270 researchers participate this workshop, where more than 250 talks were delivered among 23 mini-symposiums. Besides the talks in the 23 min-symposiums, one plenary lecture and 6 semi-lecture sections (14 lectures) were arranged.

On Sunday (April 13) : Depart from Taiwan.

I took the direct flight departing from Taoyuan airport at 10:05 and arrived at Sendai International airport around 14:10 (local time).

- Depart from Tainan: about 06:10 in the morning.
- About 17:30, arrival at the international center for registration.
- 18:00~20:00, Welcome and reception.

On Monday (April 14) :

- 09:00 Opening Ceremony
- 09:20 - 10:10 Plenary Lecture “Improvement of the Tsunami Simulation after the 2011 Tohoku Earthquake”, delivered by Prof. F. Imamura (Tohoku Univ., Japan).
- 10:30 - 12:00 Six lectures are given in two semi-plenary lecture sections.
- 13:00 - 17:20 Talks were delivered in 6 seminar rooms simultaneously.

On Tuesday (April 15) :

- 09:00 - 10:00 Four lectures are given in two semi-plenary lecture sections.
- 10:20 - 12:20 Talks were delivered in 6 seminar rooms simultaneously.
- 13:20 - 17:50 Talks were delivered in 6 seminar rooms simultaneously.
- 18:30 - 21:00 Conference banquet.

On Wednesday (April 16) :

- 09:00 - 10:00 Four lectures are delivered in two semi-plenary lecture sections.
 - 10:20 - 12:20 Talks were given in 6 seminar rooms simultaneously.
 - 13:20 - 17:20 Talks were scheduled in 6 seminar rooms simultaneously.
- My talk is scheduled in MS7-3 in the afternoon and the topic reads “A Hybrid Method for Simulating Hazardous Flows over Non- Trivial Topography”.

On Thursday (April 17) :

Return to Taiwan. I arrived at Taoyuan airport around 19:15, and about 21:45 arrived at Tainan high-speed railway station.

二、與會心得

Due to the fact that huge scale natural disasters have occurred worldwide and there are numerous vulnerable areas in Asian-Pacific regions, the studies on disaster impacts as well as disaster mitigation are inevitable and urgent. As our society has become highly dependent on technologies and technological systems, any technological failure might cause significant impact to human lives. In this event, the COMPSAFE 2014 conference focuses on topics concerned with the application of emerging computational engineering and science technologies which are expected to serve as powerful tools toward solving these complicated safety-related and environmental problems.

此次研討會以計算科學為主軸來探自然災害與環境的相關問題，會中介紹許多目前諸多計算科學的先進方法於自然災害與環境的相關問題的應用。例如 UC San Diego 的 Prof. J.S. Chen 所介紹抑制在震波附近震盪的無網格方法，德國 RWTH 的 Prof. Behr 介紹用有限元素法時對自由液面的追蹤方法，西班牙 Prof. Huerta 介紹有效及時監測港灣波浪形態

的數值計算方式，日本東京工業大學的 Prof. Xiao 介紹在非結構網格正確且穩定建構多相流中的介面方法，都能帶給報告者對目前研究課題諸多的啟發。

由於研討會所在仙台市亦為日本 2011 年 311 的地震海嘯的受災地區，會中除了計算科學的最新進展，也有許多研究是關於海嘯相關議題的探討以(例如 入侵範圍模擬評估與防治、侵蝕淤積現象、海嘯破壞力評估、房屋傾倒原因 等)及目前災後重建的相關介紹。

此次會議較為感興趣並與報告人現階段研究課題相關的議題分別有：

- “Improvement of the Tsunami Simulation after the 2011 Tohoku Earthquake”, delivered by Prof. F. Imamura (Tohoku Univ., Japan).
- “Real-Time Computational Fluid Dynamics: A Challenging Demand for Safety and Environmental Problems”, delivered by Prof. S. R. Idelsohn (Polytechnic Univ. of Cataluña, Spain).
- “Landslides Modeling Using Smoothed Particle Hydrodynamics”, delivered by G.-R. Liu (Univ. of Cincinnati, U.S.A.).
- “Computational Methods for Simulating Complex Coastal Watersheds and Floodplains”, delivered by Prof. E.J. Kubatko (Ohio State Univ., U.S.A.).
- “2D-3D Hybrid Method for Tsunami Simulation Based on Stabilized Finite Element Method”, delivered by Dr. M. Sakuraba (Nippon Koei, Japan).
- “Use of Semi-Lagrangian Reproducing Kernel Particle Method for the Simulations of Gravity Flow and Earthquake-Induced Landslide”, delivered by Prof. P.C. Guan (National Taiwan Ocean Univ., Taiwan), O.L. Annie Kwok (National Taiwan Univ., Taiwan).
- “Tsunami-induced Sediment Transport Simulation after the Great East Japan Earthquake”, delivered by Dr. Y. Tawara et al. (Geosphere Environmental Technology, Japan) and H. Tosaka (Univ. of Tokyo, Japan)
- Kernel Contact Algorithm for Simulation of Landslide with Meshfree Method, delivered by Prof. S.-W. Chi et al. (Univ. of Illinois, Chicago, U.S.A.)

此外，尚有幾個非常有啟發性的議題，例如：

- An Oscillation Limiting and Flux Conserving Meshfree Formulation for Shock Modeling, by Prof. J.S. Chen (Univ. of California, San Diego, U.S.A.)
- “Meshfree Galerkin Methods for Three-Dimensional Groundwater Flow Simulation.” by Dr. H. Sakurai et al. (Shimizu, Japan)
- “Groundwater Flow and Particle-Tracking Analysis of Headsprings in the Shikotsu Pyroclastic Plateau, Hokkaido, Japan.” by Dr. M. Ikeda (Docon, Japan) and others (GMLabo, Japan).
- “Importance of the Groundwater Flow Analysis Considering Groundwater Observation Boreholes.” by M. Nishigaki (Okayama Univ., Japan) and T. Shiraishi (Shimizu, Japan)

- “Accurately Tracking Motion of the Free Surface: Kinematic Condition and NURBS-Based Surface Representation.” by Prof. M. Behr et al., (RWTH Aachen Univ., Germany)
- “A Simple Eulerian THINC Scheme for Compressible Two-Phase Flows.” by Prof. K.M. Shyue (National Taiwan University, Taiwan)

三、發表論文摘要

Hazardous flows, such as avalanches, landslides or debris flow, are gravity-driven mass flows over topographic surfaces. To take into account the impacts of topography, an optimal coordinate system is highly requested, where the variation, the local curvature of the topography and the erosion-deposition processes can be well incorporated in the model equations. We shall present a hybrid formulation for gravity-driven flows over a non-trivial topography, where the processes of erosion and deposition might be significant. With respect to the topography in horizontal-vertical oriented Cartesian components, a terrain-fitted mesh system is introduced. The mesh system is able to evolve simultaneously with the temporally varying basal surface, so that the geometric evolution of the deposition heap is mimicked. The depth-integrated model equations are conservation laws of the horizontal-vertical Cartesian components with respect to the terrain-fitted mesh system. This hybrid method greatly simplifies the complicated computation for the varying coordinate orientation. We shall show the impacts of local curvature on the behaviors of the granular flows, the geometry of the deposition heaps and the maximum run-out distance. The features and advantages of this formulation are illustrated by numerical examples, a back-calculation of natural disaster event and a dam-break shear flow over erodible bed.

四、建議

此次研討會以計算科學為主軸來探自然災害與環境的相關問題，大會邀請目前於計算科學方面不同領域傑出學者介紹目前先進的計算方法以及實務的應用。大會是在仙臺市政府的國際會議中心舉行，所有行政流程後勤支援委託由專業的執行團隊執行，會議空間與行程均能很有效率的安排，過程清楚流暢，是相當溫馨且成果豐碩的研討會。

五、攜回資料名稱及內容

- 大會手冊 + 論文集(CD)

六、其他



會議資料



大會 Keynote Speech 之一



會場晚宴專題演講