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Disaster Reduction News

State Key Laboratory for Disaster Reduction in Civil Engineering, Tongji University

Contents

Academic Exchange Activities

1. Prof. Li-min Sun attended the 4th World Conference on Structural Control and Monitoring (4WCSCM) held in San Diego, US on Jul. 11-13, 2006, and made a presentation entitled "Design Improvement and Evaluation of Damper for Vibration Control of Long Stay Cables". Dr. Zhi Sun also attended this conference and gave an presentation entitled "Statistical strategies for online monitoring of a cable-stayed bridge".

2. Dr. Dan-hui Dan attended The 3rd International Conference on Bridge maintenance, Safety and Management held in Porto, Portugal on Jul. 16-19, 2006, and made a presentation entitled "Structural damage analysis for SHM system design of PC Girder bridge with losing of prestress".

3. Prof. Yao-jun Ge, Prof. Le-dong Zhu, Dr. Feng-chan Cao, Dr. Zhi-yong Zhou and Dr. Yong-xin Yang attended the 4th International Symposium on Computational Wind Engineering (CWE-4) held in Yokohama, Japan, on Jul. 16-19, 2006 and made 5 presentations entitled "Retrospect and prospect on computational methods for aerodynamic bridge flutter", "Skew wind effect on 2-DOF coupled flutter of a flat-box deck", "A

Blob Resizing Procedure for Diffusion in Vortex Methods", "On the mechanism of torsional flutter instability for 1st Tacoma Narrow Bridge by discrete vortex method" and "Flutter Mechanism and Flutter Modality Investigation for Thin Plate Sections".

4. Prof. Ai-rong Chen and Mr. Da-lei Wang attended the CWE-4 and made 3 presentations entitled "Aerodynamic Divergence of a Super-long Span Cable-stayed Bridge under Very Strong Wind", "Numerical Simulation of Aerodynamic Force Characteristic of Super Long Stayed Cables" and "Numerical simulation of wind environment above deck".

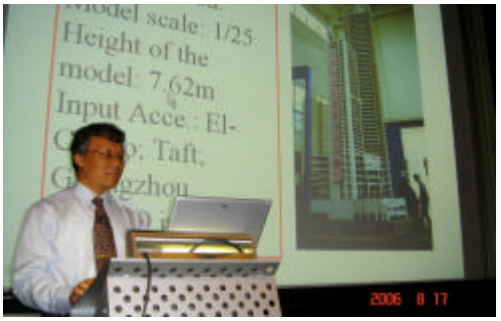
5. Prof. Ming Gu and his colleagues, Dr. Peng Huang, Dr. Xuan-yi Zhou and Dr. Ai-she Zhang attended the CWE-4 and made 5 presentations entitled "Numerical Simulations of Flow around Stay Cables with and without Fixed Artificial Rivulets", "Wind Tunnel Test and Numerical Simulation of Mean Wind Loads on a Container Crane", "Numerical Simulation of Snow Drift on the Surface of a large-span Roof Structure", "Numerical simulations of wind pressures on buildings in staggered arrangement", "Research on the parameters of turbulence model and modeling of equilibrium atmosphere boundary layer in CWE" and "Numerical Simulations of Flow around Stay Cables with and without Fixed Artificial Rivulets" .

6. Associate Prof. Yuan-qi Li attended the CWE-4 to present a paper with the title "Application of Proper Orthogonal Decomposition to Wind-resistant Analysis of Single-Layer Reticulated Structures".

7. Prof. Hai-fan Xiang and Prof. Yao-jun Ge attended the 10th East Asia-Pacific Conf. on Structural Engineering and Construction (EASEC10) held on Aug. 3-5 in Bangkok, Thailand, and made a presentation entitled "Current and Future Trends in Long-Span Bridge Design in China".

8. Prof. Li-min Sun and Mr. X.B. Yuan attended the EASEC10, and made a presentation entitled "Experimental study on pedestrian force of human-footbridge interacted vibration".

9. Prof. Xi-lin Lu attended the Sino-Switzerland Academic Exchange Meeting, held in Switzerland on Aug. 17-27, 2006, and gave a presentation entitled "Seismic performance of complicated high-rise buildings". There are 50 people attending the meeting.



10. Dr. Dan-hui Dan attended The 9th International Symposium on Structural Engineering for Young Experts held in Fuzhou on Aug. 18-21, 2006, and made a presentation entitled "Discussion on Bridge Health Monitoring Research and Application on Donghai Bridge". Dr. Zhi Sun, also attended this symposium and gave an presentation entitled "Wavelet Based Modal Identification Using Non-stationary Response Measurements".

11. Prof. Guo-qiang Li was invited to give a keynote lecture in the 9th International Symposium on Structural Engineering for Young Experts-Advances in Structural Engineering in Fuzhou, China on Aug.

18-21, 2006.

12. Prof. Li-min Sun was invited by the Japan Bridge Press, Japan Techno-Science Company, and Japan Great Wall Consulting Company to give a lecture at the 1st China Bridge Seminar held in Tokyo, Japan on August 25, 2006. At the seminar, Prof. Sun introduced the state of the art of bridge constructions in China.

13. Prof. Hai-fan Xiang and Yao-jun Ge attended the IABSE Symposium 2006—Responding to Tomorrow's Challenges in Structural Engineering, held on Sep. 10-15, 2006 in Budapest, Hungary, and gave a presentation entitled "Tomorrow's Challenge in Bridge Span Length".

14. Prof. Xi-lin Lu attended the IABSE Symposium 2006, and gave a presentation entitled "Experimental study on seismic behavior of steel reinforced concrete walls".

15. Prof. Ai-rong Chen and Dr. Xin Ruan attended the IABSE Symposium 2006 and made 3 presentations entitled "Form Study of Taizhou Yangtze River Highway Bridge", "Wind speed criteria of traffic safety on a long trans-oceanic bridge" and "Risk Analysis for Large Scale Bridges Considering the Public Willing".

16. Prof. Li-min Sun attended the IABSE Symposium 2006 and made a presentation entitled "Health monitoring system for a cross-sea bridge project in Shanghai".

17. Prof. Guo-qiang Li attended the International Symposium on Worldwide Trend and Development in Codified Design of Steel Structures in Singapore on Oct. 2-3, 2006 and made a presentation entitled "The design codes for the safety of steel structures in China".

18. Prof. Guo-qiang Li attended the International Symposium on Worldwide Trend and Development in Codified Design of Steel Structures in Kuala Lumpur, Malaysia on Oct. 4-5, 2006 and gave a presentation entitled "The design codes for the safety of steel structures in China".

19. Dr. Wei Cheng attended the Materials Science & Technology 2006 Conference and Exhibition (MS&T 06) held in Cincinnati, OH., US on Oct. 15-19, 2006, and made a presentation entitled "A new method for modeling 3D constitutive relation based on orientational components".

20. Associate Prof. Yuan-qi Li attended the International Symposium on New Olympic, New Shell and Spatial Structures held on Oct. 16-19, 2006 in Beijing, China, to present a paper with the title "Order-Reduced Modal Analysis Based on the Pod Technique for Spatial Structures under Wind Loading".

21. Prof. Li-min Sun and all the members in his research team attended the 4th China-Japan-USA Symposium on Structural Control and Monitoring held in Hangzhou on Oct. 16-18, 2006, and Prof. Sun gave a keynote speech on "Optimum Design of Dampers for Stay Cable" and other members each made an oral presentation at different sessions.

22. Prof. Xi-lin Lu attended the International Construction Information Seminar 2006, held in Japan on Oct. 18-24, 2006, and gave a presentation entitled "Seismic resistance and passive control study on high-rise buildings with application".

23. Prof. Xi-lin Lu attended the 7th Sino-Japan Building Technology Exchange Meeting, held in Chongqing on Oct. 23-26, 2006, and gave a presentation to introduce his new

book entitled "Seismic Design Guidelines for Out-of-Code High-rise Buildings".

24. Prof. Hai-fan Xiang, Dr. Quan-shun Ding and Yong-xin Yang attended the International Conference on Bridge Engineering held in Hongkong on Nov.1-3, 2006, and made 3 presentations entitled "Aerodynamic Flutter Stabilization for the East Sea Bridge", "Buffeting analysis of stonecutters bridge based on Experimentally Determined Aerodynamic Parameters" and "Flutter Analysis of Stonecutters Bridge using a Single-parameter Searching Approach".

25. Prof. Yao-jun Ge attended the Proceedings of the 3rd Workshop on Regional Harmonization of Wind Loading and Wind Environmental Specifications in Asia-Pacific Economies, held in New Delhi, India, on Nov. 2-3, 2006, and made a lecture entitled "Peak Wind Loading for Cladding".

26. Prof. Guo-qiang Li attended the International Symposium on Innovative Design of Steel Structures in Hongkong, China on Nov. 10th, 2006, and made a presentation entitled "A Practical Design Method for Semi-Rigid Composite Frames under Vertical Loads".

27. Prof. Guo-qiang Li was invited to give a keynote lecture entitled "Fire-Resistance Design of Steel Structures for Large Space Buildings" in the 4th International Symposium on Steel Structures (ISSS'06) in Seoul, Korea on Nov.16-18, 2006.

28. Prof. Yi-yi Chen attended the ISSS'06 and made a presentations entitled "Evaluation of Moment Capacity of Cross-Junction Type Joint For Tubular Structure".

29. As the chairman of the organizing committee, Prof. Guo-qiang Li attended the 4th conference on steel construction in China (Mainland, Hongkong and Taiwan), which is held in Shanghai on Nov. 23-24, 2006.

30. Prof. Xi-lin Lu attended the International Workshop on Response Control and Seismic Isolation of Buildings, held in Guangzhou on Nov. 26-28, 2006, and gave a presentation entitled "Passive Control Studies with Engineering Applications".

31. Prof. Li-min Sun attended the Asia-Pacific Workshop on SHM held in Japan on Dec. 4-6, 2006, and made a presentation entitled "Health Monitoring System for Donghai Bridge in Shanghai".

32. Prof. Xi-lin Lu and his team attended the US-China Workshop on Collaborative Research in Structural Engineering, held in Changsha on Dec. 15-16, 2006, and gave a presentation entitled "Dynamic similitude relationships of steel-concrete hybrid structure for high-rise buildings".

33. Dr. Jian-bing Chen, as a one-year visiting scholar fully financially supported by the China Scholarship Council, visited and worked with Prof. Roger Ghanem at the Univ. of Southern California since June, 2006.

34. Prof. Jie Li visited the University of Southern California on Sept. 13th, 2006 and gave a seminar on "Stochastic Dynamics of Structures, An Physical Approach".

35. Prof. Jie Li, as a senior visiting professor, visited California Institute of Technology during August through October, 2006.

36. On Aug. 8th, 2006, Prof. Yukio Tamura, President of Japan Association of Wind Engineering, was invited by Prof. Zu-yan Shen and Associate Prof. Yuan-qi Li to visit Tongji University and gave a lecture entitled "Extreme Wind Events in Asian Region: Full-Scale Observations, Wind Tunnel Simulation and Damage Assessments".

37. Prof. Ashan Kareem, as a professor of Univ. of Notre Dame and honorary professor of Tongji Univ., visited Tongji Univ. and gave a lecture entitled "Wind Effects on Structures" in Oct.

38. Prof. You-lin Xu, from the Hong Kong Polytechnic University, was nominated as a guest professor of Tongji University in the afternoon on 16 Aug. 2006. The ceremony was held in the auditorium of Bridge Building at Tongji University, and was emceed by Prof. Yao-jun Ge, the head of the Department of Bridge Engineering. Prof. Guo-qiang Li, a vice president of Tongji University and Prof. Hai-fan Xiang, an academician of Chinese Academy of Engineering, attended the ceremony. Prof. Li awarded the certificate and a university badge to Prof. Xu. Immediately after the ceremony, Prof. Xu presented a wonderful and attractive seminar lecture titled "Wind-Vehicle-Bridge Interaction".

39. Invited by Prof. Le-dong Zhu, Prof. Kenny C S Kwok and his wind tunnel team of CLP Power Wind/Wave Tunnel Facility at the Hong Kong University of Science and Technology (HKUST) visited the Wind Tunnel Testing Division of the SLDRCE at Tongji University during 24 and 25 Nov. 2006. The visiting group was comprised of 18 persons including all the staffs and some postgraduate students of the laboratory at HKUST. During the event, the two wind tunnel teams from the two laboratories had a conversation meeting to exchange extensively the advances in the wind engineering, the latest developments of wind tunnel test technology and the experience of the management of the wind tunnel laboratory. Finally, Prof. Kwok made an impressive and comprehensive seminar presentation titled "The role of wind engineering in a typhoon prone urban environment".

Research and development

1. He'nan Broadcast and TV Tower is a multifunction tower, with the functions of broadcast, TV emission and sightseeing, etc. It will be the highest pure steel tower in the world with the height of 388 meters. Because the super-high tower structure is complicated, the earthquake-resistant behaviors must be studied. A 1:40 scaled model of He'nan Tower was designed and constructed in Shaking Table Testing Division of SLDRCE, and a series of earthquake simulation test were carried out on the shaking table with different waves and earthquake levels. The dynamic properties, responses of acceleration and displacement under different wave peak values were studied, and the weak positions of the structure were found.

2. "The Second-Class China National Award for Science and Technology" was granted to Prof. Xi-lin Lu and his team by the No. J-221-2-01 in December, 2006.

3. Prof. Xi-lin Lu and his team invented a new type of Composite Isolation Bearing, which was patented by the No. ZL2005 2 0045412.3 in November 2006.

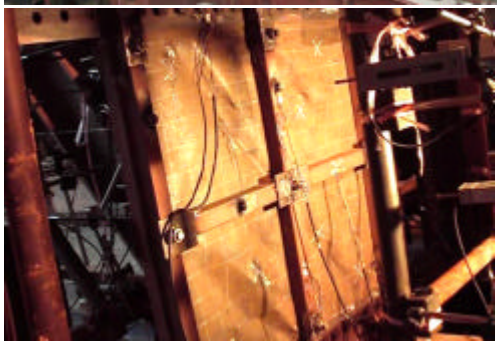
4. Prof. Zu-yan Shen and his term recently finished several important projects, such as:

   (1) Reliability Analysis and Design methods of 550MPa High-strength Cold-formed Thin-walled Steel Structures. This project are commissioned by National Standard Management Committee for Technical Code of Cold-formed Thin-walled Steel Structures, and Light Steel Structure Committee of China Association for Engineering Construction Standardization (CECS), and cooperated with BlueScope Steel (Shanghai) Co. Ltd. The main purposes were to offer the suitable design method and determine reasonable design strength based on design reliability analysis for 550MPa High-strength Cold-formed Thin-walled Steel Sections, which are widely used in US and Australia but out of the provisions in current Technical Code of Cold-formed Thin-walled Steel Structures, GB50018. A series of research works are conducted for load-carrying capacity design for deferent sections, connections and wall systems, and aseismic behaviors, which will be finished at the beginning of 2007.

   (2) Design Theory for Aluminum Alloy Extruded Members. This project was just finished in this year. The research and appraised by the expert committee organized Shanghai Construction and Management Committee on Sep.18th, 2006.

5. Prof. Guo-qiang Li and his team completed the experimental research on composite and steel shear walls. A type of two-sided composite steel plate wall (CSPW) was studied, omitting the connection between an ordinary CSPW to its boundary columns, in order to remove its adverse influence on seismic performance of those columns.

Three scaled models of two-sided CSPWs and a two-sided restrained SPSW (steel plate shear wall) were tested. The CSPW specimens were prefabricated and installed by connecting its concrete plate to its steel plate with bolts, providing the steel plate out-of-plane buckling resistance. One specimen with single concrete plate was loaded monotonically, while the other two with bilateral concrete plates were tested under cyclic loading. The latter 2 specimens differed to each other in the thickness and reinforcement of the concrete plates. The SPSW specimen was composed of a two-sided steel plate bolted with hollow tubes as out-of-plane restraints. Experimental results showed excellent seismic performance of CSPWs with strong concrete plates and fairly good performance of the SPSW. Theoretical analysis was also performed to simulate the test.

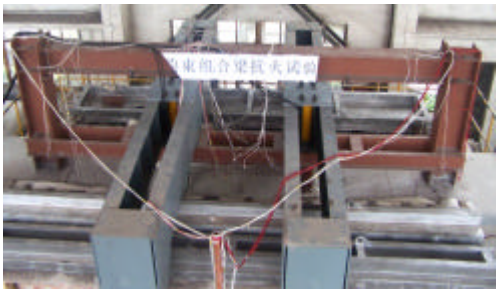


6. Supported by the Natural Science Foundation of China for Distinguished Young Scholars (No.50225825), Prof. Guo-qiang Li and his team have conducted theoretical and experimental studies on active control of cable vibration. Based on traditional Bang-Bang single modal control strategy, linear quadratic optimal control strategy and criterion of optimal active control, the simplified model of D-V-I (Displacement-Velocity-Integration) Bang-Bang control is proposed for active multi-modal control of cable vibration. To apply this strategy, a coil hydraulic servo active controller has been designed and tested in the experiment on active control of cable vibration through changing the axial force in the cable. Validity of Bang-Bang active control strategy and good performance of this active control device on mitigating cable vibration have been verified.

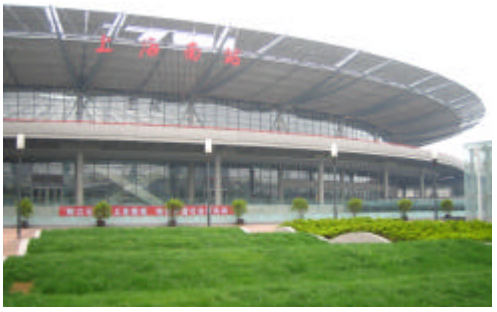
7. Prof. Guo-qiang Li and his team completed the project on the behavior of restrained steel beam during the heating and cooling phase in fire and the damage of beam-to-column connection. The main objective of this project was to study the behavior of restrained steel beam during the heating and cooling phase in fire by experimental investigation and theoretical analysis. Based upon the principle of virtual work and the large deflection theory of beam, an analytical procedure capable of predicting the whole process of structural behavior of restrained steel beam subjected

to fire was established. The influence of local buckling on the behavior of restrained steel beams in fire was taken into account. A simplified fire-resistant design method for restrained steel beams was developed.

8. Prof. Guo-qiang Li and his team completed the work on the study on the behavior of steel-concrete composite beams subjected to fire. Tests on two full scale specimens of restrained composite beams exposed to fire were carried out. The axial restraints and rotation restraints of the tested composite beams were provided by a exterior steel frame which was outside the furnace. Based upon the test results, a simplified analytical method for evaluating the temperature of components of composite beam was established. And then an analytical procedure capable of predicting the change of the axial force, moment and deflection of restrained composite beams in fire was developed. The influence of load ratio, stiffness of restrains, cross-sectional area ratio of steel beam to concrete slab and reinforcement ratio on the behavior of composite beams exposed to fire was investigated. A simplified approach for fire-resistance design of restrained composite beams was proposed.



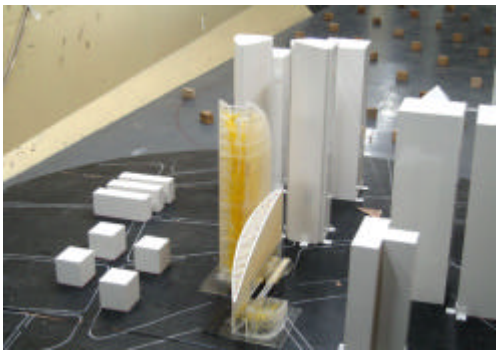
9. The main structure at Shanghai South Railway Station is a circle steel shell structure with 260m diameter. The ground motion for aseismic design of the structure was determined by equivalent linear dynamic analysis of site soil layer with 240m in depth under seismic excitation at rock surface. Prof. Meng-lin Lou and his team completed the project.



10. The container handling crane exported to Iran Port was made by Zhenhua Port Machinery Co., Ltd'. A new device to suppress the seismic response of the

container handling crane was designed. The results of the model test demonstrated the effectiveness of the device and aseismic ability of the container handling crane. Prof. Meng-lin Lou and Dr. Wen-sheng Lu were responsible for this test project.

11. Prof. Ming Gu and his team recently completed the wind-resistant research work on Shanghai Merchant Bank. The research work includes a wind tunnel test of the scaled model for wind pressures acting on the structure, computations of static and dynamic responses as well as the equivalent static wind loads by using a computer program named SWDP developed by the research team.



Model of Shanghai Merchant Bank in Wind Tunnel

12. The project on "Development and Application of Health Monitoring System on Sea-crossing Bridge" , which was supported by the Science and Technology Committee in Shanghai, was completed successfully by Prof. Li-min Sun and his research team. Final report was submitted and final evaluation was carried out, indicating a perfect closing of this project.

13. Mid-term evaluation of the project "Evaluation System of the Safety and Durability of Bridge Stay Cable and Its Maintenance Techniques" , which was supported by the Western Communication and Construction Technology Project, was held in Nov. 2006. Prof. Li-min Sun and his research team were responsible for this test project. Representatives from each participant organization of the project attended the meeting. The progress of the project was reported, which showed that all the planned research works were completed successfully and in time. The schedule of future works was also discussed to ensure a perfect closing of the project.

14. The project entitled "Wind Resistance Analysis of High-Rise Tower Crane" , which was supported by the Third Nanjing Bridge Construction Commanding Department, was completed successfully. In this project, the analysis and assessment of the static and dynamic behavior of a high-rise tower crane, which was employed during the construction of the 300.6-meters-high cable pylons of Sutong Bridge, has been carried out in order to ensure its safety and serviceability, especially in the wind season. An analytical modeling of the tower crane is conducted firstly according to the configuration of the crane. Spatially correlated wind velocity at the location of the tower crane is then simulated using an algorithm for generating

time domain samples of a stationary, multivariate stochastic process according to some prescribed spectral density matrix. The buffeting forces applied to the structure are computed according to the above-simulated wind velocity fluctuations and the lift, drag, and moment coefficients obtained from a CFD computation. The analyzing results were used for the decision making during the construction of cable pylon of Sutong Bridge in the passed wind season.

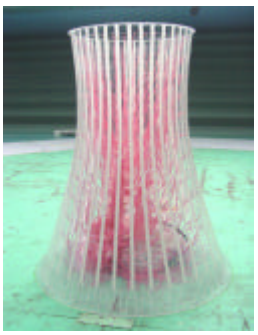
15. Shanghai Yangtse River Bridge is a main section of the Chongming Island – Mainland Connection Project in Shanghai. It is a double-tower double-cable-plane cable stayed bridge with the centre span of 730m. The main stiffening girder is central-slotted steel box girder with the total width of 51.5m. 1:60 and 1:25 sectional model tests were conducted to check the aerodynamic performance of the bridge structure, especially the vortex-induced vibration, and aerodynamic controlling measure was designed and tested to mitigating the oscillation amplitude. Finally 1:150 full aeroelastic wind tunnel tests and corresponding theoretical analyses were carried out to give a thorough evaluation on the aerodynamic performance of Shanghai Yangtse River Bridge. Prof. Yao-jun Ge and his team completed the project.

16. Dagu River Channel Bridge is one of the three main navigational channel bridges of Qingdao Bay Bridge Project in Shandong Province. It is a two-span self-anchored suspension bridge with the centre span of 260m. The main stiffening girder is central-slotted steel box girder with the total width of 47m. 1:80 and 1:25 sectional model tests were conducted to check the aerodynamic performance of the bridge structure, especially the vortex-induced vibration, and aerodynamic controlling measure was designed and tested to mitigating the oscillation amplitude. Finally 1:118 full aeroelastic wind tunnel tests and corresponding theoretical analyses were carried out to give a thorough evaluation on the aerodynamic performance of Dagu River Channel Bridge. Prof. Yao-jun Ge and his team completed the project.

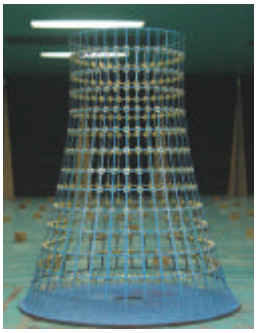
17. As a main section of the Zhoushan Island – Mainland Connection Project in Zhejiang Province, Xihoumen Bridge is proposed as a two-span continuous suspension bridge with the centre span of 1650m, which is going to create a new record in box-deck suspension bridges. A central-slotted box girder section

was chosen as the main stiffening girder section for this bridge based on the evaluation of the flutter performances of several typical girder sections by 1:80 sectional model wind tunnel tests. Then 1:40 and 1:20 sectional model tests, 1:208 full aeroelastic model tests and corresponding theoretical analyses were carried out to check the aerodynamic performance of the bridge structure. Some vibration controlling measures were designed and tested to mitigating windinduced vibrations of Xihoumen Bridge. Prof. Yao-jun Ge and his team completed the project.

18. The aerodynamic and aeroelastic model tests of the highest cooling towers in China, group tower combination wind-resistance research supported by Guohua electronic company in Zhejiang province, were carried out in the TJ-3 Boundary Layer Wind Tunnel of Tongji University. The so-called "equivalent beam-net design method" of aeroelastic model of cooling tower was firstly proposed. Several 1:200 scaled models about rigid pressure-measured models and aeroelastic model were designed and constructed, and a series of wind-induced interference tests about group towers effects and wind-vibration factors of the super large cooling towers were carried out. The testing conclusions were compared with the corresponding items of Chinese codes, and some suggestions to improve items of codes were finally proposed.

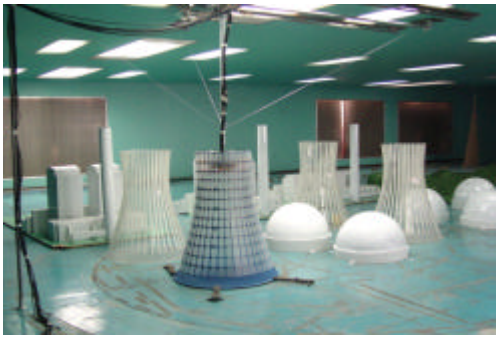


a) External pressure model *b) Internal pressure model*



c) Aero-elastic model

Three types of models (1:200)



General map about ***II*** *and* ***III*** *stage cooling tower groups*

International Publications (Abstract)

1. Identification of flutter derivatives of bridge decks using stochastic search technique

(Published in *Wind & Structures*, 9(6): 441-455, 2006)

Identification of flutter derivatives of bridge decks using stochastic search technique

A.R. Chen, F.Y. Xu & R.J. Ma

Abstract A more applicable optimization model for extracting flutter derivatives of bridge decks is presented, which is suitable for time-varying weights for fitting errors and different lengths of vertical bending and torsional free vibration data. A stochastic search technique for searching the optimal solution of optimization problem is developed, which is more convenient in understanding and programming than the alternate iteration technique, and testified to be a valid and efficient method using two numerical examples. On the basis of the section model test of Sutong Bridge deck, the flutter derivatives are extracted by the stochastic search technique, and compared with the identification results using the modified least-square method. The Empirical Mode Decomposition method is employed to eliminate noise, trends and zero excursion of the collected free vibration data of vertical bending and torsional motion, by which the identification precision of flutter derivatives is improved.

2. Wind tunnel and full-scale study of wind effects on China's tallest building

(Published in *Engineering Structures*, 28(12): 1745-1758, 2006)

Wind tunnel and full-scale study of wind effects on China's tallest building

Q.S. Li, J.Y. Fu, Y.Q. Xiao, Z.N. Li, Z.H. Ni, Z.N. Xie and M. Gu

Abstract The Jin Mao Building with a height of 420.5 m and 88-storeys, located in Shanghai, is the highest tall building in Mainland China. This paper presents selected results from a combined wind tunnel and full-scale study of wind effects on the super tall building. In the wind tunnel test, mean and fluctuating force components on the building model for the cases of an isolated Jin Mao Building and the building with existing surrounding condition were measured by a high-frequency force balance technique under suburban and urban boundary layer wind flow configurations, respectively. Force coefficients, power spectral densities, displacement and acceleration responses were then presented and discussed. A detailed comparative study was conducted to investigate the influences of incident wind direction, upstream terrain conditions and interferences from the surroundings on the wind effects on the building. Serviceability of the super tall building under strong wind action was analyzed on the basis of the experimental results. On the other hand, full-scale measurements of wind effects on the Jin Mao Building were conducted under typhoon conditions. The field data, such as wind speed, wind direction and acceleration responses were simultaneously and continuously recorded during the passage of Typhoon Rananim in August, 2004. Analysis of the field data was carried out to investigate typhoon effects on the super tall building. Finally, the wind tunnel test results were found to be in good agreement with the full-scale measurements, illustrating that the wind tunnel tests can provide satisfactory predictions of wind-induced vibrations of the super tall building under typhoon conditions.

List of other recent publications

2. Jie Li and Jian-ying Wu. Energy-based CDM Model for Nonlinear Analysis of Confined Concrete Structures. *American Concrete Institute*, SP-238:209-221, 2006.
3. Yuan-qi Li, Lei Wang, Zu-yan Shen, Yan-min Wang, Hong-wei Xu. Load-Carrying Capacity Design for Axial Compressed Members of 550MPa High-strength Cold-formed Thin-walled Steel Structures, *Building Structures*, 36(8):1-5, 2006.
4. Pei–feng Wu, Bu-quan Zheng, Ai-rong Chen. A Method for Reducing the Prestress Loss due to Elastic Compression of Concrete. *Central South Highway Engineering*, 31(5):48-51, 2006.
5. Chuang-di Li, Tian-li Huang, Tun Li, Wan-jie Zou, Zhong Fang, Zhi-xing Lin. Optimal TMD design and shaking table test. *China Civil Engineering Journal*, 39(7):19-25, 2006.
6. Fu-you Xu, Ai-rong Chen, Ru-jin Ma. Identification of flutter derivatives of bridge decks on the basis of stochastic search technique. *China Civil Engineering Journal*. 39(7):63-68, 2006.
7. Yong-Xin Yang, Yao-jun Ge, Hai-fan Xiang. Flutter controleffectand m echanism ofcentral-slotting for long-span bridges. *China Civil Engineering Journal*. 39(7):74-80, 2006.
8. Yan Xu, Shi-de Hu. A study on the dynamic ultimate capacity of CFST arch bridges. *China Civil Engineering Journal*. 39(9):68-73, 2006.
9. Wei-chen Xue, Yi-yi Chen, Dong-sheng Jiang, Zhuang-tao Xu, Yin-Ru Lin. Experimental study on large precast prestressed concrete spatial structures. *China Civil Engineering Journal*. 39(11):15-21, 2006.
10. Ming Gu, Xuan-yi Zhou, Peng Huang. A study on wind induced buffeting responses of large-span roof structures, *China Journal of Civil Engineering*, 39(11): 37-42, 2006.
11. Chun-sheng Wang, Ai-rong Chen, Jian-guo Nie, Wei-zhen Chen. Probabil istic assessment of remaining fatigue l ife for existing railway steel bridges. *Chinese Journal of Computational Mechanics*. 23(4):408-413, 2006.
12. Jia-bin Pang, Da-lei Wang, Ai-rong Chen, Zhi-xing Lin. Probability Evaluating Method of Bridge Deck Side Wind Effects on Driving Safety. *China Journal of Highway and Transport*. 19(4):59-64.
13. Fu-you Xu, Ai-rong Chen, Jian-ren Zhang. Flutter Reliability of Cable Supported Bridge. *China Journal of Highway and Transport*. 19(5):59-64, 2006.
14. Jie Li, Jian-bing Chen. The joint probability density function for nonlinear dynamic stochastic response of structures. *Chinese Journal of Theoretical and Applied Mechanics*, 38(5): 652-659.
15. Xi-lin Lu, Chun-guang Meng, Ye Tian. Shaking table test and elasto- plastic time history analysis of a high-rise CFRT frame structure with dampers. *Earthquake Engineering and Engineering Vibration*, 26(4): 231-238, 2006.
16. Meng-lin Lou,Gang Zong, Wei-xing Niu, Gen-da Chen. Shaking table model test of soil-pile-steel structure interaction system. *Earthquake Engineering and Engineering Vibration*, 26(5): 226-230.
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