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Vector From Intrinsic Finite Element (VFIFE) Method and Its Application to Simulation of Structural Collapse, Crack Propagation, and Bridge-Train Interaction

by

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SEMINAR ABSTRACT

The newly developed Vector Form Intrinsic Finite Element (VFIFE) method simulates continuous body by mass particles, and thus converts the issue of structural defamation into particle motion. The mass particles are inter-connected by elements that have no mass but bear internal forces. The motion of the mass particles complies with the second Newton's law. In time domain, the structural motion is separated into a series of path elements. Continuous motion and small deformation with possibly large rigid body movement occur within a path element. The pure deformation is obtained by a fictitious reverse motion. Discontinuous motion and change of structural configuration, loading condition, and mechanical property only occur at the starting time instants of path elements. The global stiffness matrix is not in need. These unique characteristics enable the VFIFE method to easily handle the problems of the large deformation, large displacement and fracture. Application of this method to the simulations of seismic collapse of a cable-stayed bridge, crack propagation, and bridge-train interaction will be introduced.

SPEAKER'S BIOGRAPHY

Dr. Yuan-feng Duan is a professor of Structural and Bridge Engineering, and Associate Head of Department of Civil Engineering, College of Civil Engineering and Architecture, Zhejiang University. He obtained his Ph.D. degree from The Hong Kong Polytechnic University in 2004, and joined Zhejiang University in 2008 as an associate professor. His research interests include Structural Health Monitoring and Vibration Control, Vector Mechanics and Structural Dynamics. He is a vice director of the youth sub-committee and member of Specialty Committee of Structural Vibration Control and Health Monitoring, Chinese Society of Vibration Engineering. He is the obtainers of National Natural Science Grant for Excellent Young Scientist, Zhejiang Provincial Grant for Distinguished Young Scientist, and Fok Ying Tung Grant. He has been the principal investigators of 5 National Natural Science Foundation Grants. He has published 1 monograph and 80 technical papers, including 20 SCI indexed and 20 EI indexed papers. He has been awarded 5 international invention patents. His research outputs have been applied to health monitoring or vibration control of several large-scale structures, such as Dongting Lake Bridge, Quanzhou Bay Bridge, 2nd Jiaojiang Bridge, and Chenglang Bridge.

***** All Interested Are Welcome *****