



GUEST EDITORIAL

Introduction

Amarjit Singh¹ and Frank Yazdani²

The papers in this special issue are an offshoot of the 1st International Structural Engineering and Construction Conference, ISEC-01 held in Honolulu, Hawaii, January 24-27, 2001. A call for papers was announced to significantly upgrade and enhance the ISEC-01 papers or submit new papers. Twenty-five papers were submitted, of which five were eventually selected for this special issue.

Papers were rigorously reviewed by at least three reviewers for originality, contribution to the literature, and soundness of research. Of the five papers, one is in the area of construction management, while four are in the area of structural engineering. All papers use computing in the development of their solutions.

The structural papers presented in this special issue of the journal represent two currently active research topics in the structural engineering community, namely earthquake resistant buildings and nonlinear analysis of structures.

The first paper on construction management by Senouci and Naji presents a mathematical model for resource-constrained scheduling of construction projects. The scheduling objective is to extend the project duration as little as possible beyond the original critical path duration in such a way that the resource constraints are met. Activity precedence relationships, multiple crew-strategies, and time-cost trade-off are considered in the model. Any linear or nonlinear function can be used for both activity direct cost-duration and resource-duration relationships. The non-linear optimization problem is solved using an augmented Lagrangian genetic algorithm model. For specified resource limits, the model yields the optimum / near-optimum total construction costs. The hybrid genetic algorithm model expectedly outperforms the traditional CPM approach because of the additional feature of total cost-optimization, and resource-constrained scheduling.

The paper by Zatar and Mutsuyoshi presents an experimental and computational effort to advocate the use of pre-stressed concrete bridge columns in high seismic areas. One objective of the research was to develop a realistic testing technique that could be employed for evaluating PC columns as well as monitoring their perform-

1. University of Hawaii at Manoa
2. North Dakota State University

ance for shear strength reduction. Innovative testing schemes are proposed in the paper.

The second paper in the area of earthquake resistant buildings is authored by Kilar and Krstulovic-Opara. The paper presents experimental and computational study on the seismic response of a four story composite building frame. Comparisons are made to the conventional RC frame buildings. The composite frames tested show a significant reduction in ultimate displacement and story drift as well as smaller damage in its members.

The concept of damage in structural members is the focus on the other two papers representing the structural engineering contribution to this special issue of IT-AEC. Both papers utilize a relatively new field of continuum damage mechanics as a tool for the nonlinear analysis of the structures. The paper by Mahmoud presents a 1-D damage model to study the fracture behavior of bridge components under mode I (tensile) loading. It considers the interaction between distributed microcracks and a macrocrack at the crack tip. Such modeling tools are used to predict bridge life in a fatigue loading environment.

The second paper in this area by Yazdani and Schreyer presents the application of an anisotropic damage model to study the nonlinear response of concrete shear walls. The changes in the structural and material stiffness, and reduction of the natural frequency, are useful engineering information for the reliable engineering of such structures. The paper also proposes a model to predict stiffness reduction due to shrinkage cracking.

Many thanks go to the many reviewers who assisted in the evaluation of all papers. Without them, we would not have been able to produce a first-quality issue.