Int. J. Vehicle Design (Special Issue), Vol. 26, No. 4, 2001

Foreword to the Vehicle Safety Technology Special Issue

The subject of this Special Issue of the *International Journal of Vehicle Design*, 'Vehicle Safety Technology', is too broad to fully cover in one issue of any journal. Indeed several conferences are dedicated to this subject every year. The goal of this Issue is therefore to provide a broad, but by no means comprehensive cross-section of some of the current research in the field of vehicle safety. We, the editors, sincerely hope we have fulfilled this goal.

One of the key drivers of the continual improvement in vehicle safety is the development and improvement of computer aided design tools. These tools allow engineers to test a large number of design variations in a short period of time. These tools provide valuable direction to the engineers early in the design process. Three of the papers in this Special Issue describe computer aided structural design tools. Ambrósio and Gonçalves describe a methodolgy using nonlinear flexible multibody dynamics to provide meaningful design guidance before there is sufficient information to construct a detailed finite element model. Blumhardt's paper gives an overview of finite element crash simulation and optimization and Gu *et al.* present a response surface based design optimization method appropriate for safety applications and demonstrate this method on side impact example.

The paper by Kress and Kress presents a computational tool for analyzing the effectiveness of braking strategies for vehicles rolling downhill. This tool has potential applications both for accident reconstruction and for assessing brake system designs.

The proliferation of electronic devices intended to improve driver safety has sparked a debate on the effectiveness and safety of driver interfaces for these devices. The paper by Meitzler *et al.* describes an experimental study to assess one such interface, in this case a Heads Up Display for Infrared night vision system.

Two papers in this Issue are on the subject of crash pulse characterization. The paper by Shen *et al.* describes a step-function parameterization of a frontal crash pulse and associated regression formula for occupant injury criteria. The paper by Gearhart gives a historical review of crash pulse analysis literature and presents some recent results using wavelet analysis to characterize frontal crash pulses.

Biomechanics is of fundamental importance to the field of vehicle safety research. The ultimate goal of vehicle safety design is to ensure, to the extent possible, the safety of the vehicles occupants. Without good human surrogates, both physical and mathematical, it would be impossible to assess the effect of vehicle designs on the safety of the occupant. This Issue contains two review articles on biomechanics. The paper by Bedewi gives an overview of biomechanics as it applies to the automotive industry, and the paper by Yang reviews mathematical human models used in vehicle safety design.

As was stated earlier, many conferences and symposia are held each year on different aspects of vehicle safety. Although it is impossible to report on all of these, we are pleased to be able to include an overview of the second international truck and bus safety symposium submitted by Zacharia *et al.*

Because of the broad scope of this Special Issue I am especially indebted to the diverse group of people who assisted us with the review process. I would also like to thank and congratulate the authors who contributed to this issue.

Chris Gearhart, Guest Editor

Safety Research and Development, Ford Research Laboratory, Room 2122, MD 2115, 2101 Village Road, Dearborn, MI 48124, USA.