

Friday, March 27, 2009

12:00—1:00 PM

Palmer Hall Room 3190

Virtual Prototyping - A Virtual Tire Testing Machine

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Abstract:

A full nonlinear finite element P185/70R14 passenger car radial-ply tire model as shown in the figure was developed and ran on a 1.7-meter-diameter spinning test drum/cleat model in order to investigate the tire transient response characteristics. The tire model was constructed to its extreme complexity with a three-dimensional solid, layered membrane, and beam elements. In addition to the tire model itself, the rim was also included and rotated with the tire with proper mass and rotational inertial effects. In order to validate the effectiveness and integrity of this simulation strategy and the FEA tire model, tire-model parameters were tested, verified, and shown to be in excellent agreement with the experimental results from this research, the previous empirical data, and theoretical/analytical derivations of other investigators.

Biographical notes:

Yin-Ping (Daniel) Chang received his BS and MS degrees from the Department of Mechanical Engineering, National Sun-Yat-San University in Taiwan. He worked at MMC (Mitsubishi Motor Corporation) as a new-vehicle development project manager working with GM, Delphi, Siemens, and Lotus. He later studied transportation, computational solid mechanics, vehicle dynamics and tire mechanics at Vehicle Simulation Research Center, Pennsylvania Transportation Institute, the Pennsylvania State University. He received his PhD in 2002 and continues his research as an Associate Professor at Oakland University, Rochester, Michigan. His current research interests include vehicle dynamics and tire mechanics, FEA computational solid mechanics, biomechanics, machine design/dynamics, and mechanism synthesis and analysis.



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