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Nota di contenuto	Cover; Title Page; Copyright Page; Table of Contents; Preface; Chapter | one - Vehicle Architectures, Structures, and Safety Requirements; 1.1 - Introduction; 1.2 - Legislative requirements; 1.3 - Occupant injuries; 1.3.1 - The crash test dummy families (or the tools to capture injury criteria); 1.3.2 - Typical injury criteria; 1.3.2.1 - Head injury criteria (HIC); 1.3.2.2 - Head injury criteria for free motion head form (HIC(d)); 1.3.2.3 - Neck injury criteria (Nij); 1.3.2.4 - TI (Tibia index); 1.3.3 - Surrogate impactors; 1.3.4 - Human computer models 1.4 - Typical vehicle architectures and scope for optimization1.4.1 - Ladder frame; 1.4.2 - Tubular structures; 1.4.3 - Integral structures; 1.4.4 - Shape and size; 1.4.5 - Materials and manufacture; 1.5 - Holistic approach to vehicle design; 1.5.1 - Overall architecture design for structural instruction limitation; 1.5.2 - Local shape and sizing for legal and other desirable structural requirements; 1.6 - Conclusions and opportunities; References; Chapter | two - Numerical Techniques for Structural Assessment of Vehicle Architectures; 2.1 - Introduction to finite element analysis (FEA)

2.2 - Theory of elasticity2.3 - Elements; 2.3.1 - One-dimensional elements; 2.3.2 - Two-dimensional elements; 2.3.3 - Three-dimensional elements; 2.3.4 - Zero-dimensional elements; 2.3.5 - Meshing strategy; 2.3.6 - Element type; 2.3.7 - Element shape; 2.3.8 - Element size; 2.4 - Fundamental explicit and implicit finite element analysis; 2.5 - Nonlinear explicit finite element analysis; 2.5.1 - Understanding the need for explicit FEA in connection with vehicle safety assessment; 2.6 - Explicit FEA applied to vehicle safety assessment
2.6.1 - Standard explicit equations and convergence criteria2.6.2 - Stress wave propagation and timestep; 2.6.3 - Relating the timestep to explicit FEA for vehicle safety assessment; 2.6.4 - Critical element length; 2.6.5 - Summation of factors influencing the timestep magnitude; 2.6.6 - Importance of consistent mesh size; 2.6.7 - Manipulating timestep magnitude; 2.7 - Contacts; 2.7.1 - Panel-to-panel contacts; 2.7.2 - Tied contacts; 2.8 - Example convergence study of explicit FEA; 2.8.1 - Contact forces; 2.8.2 - Kinetic energy; 2.8.3 - Internal energy; 2.8.4 - Total energy
2.8.5 - Summation of convergence studyReferences; Chapter | three - Introduction to General Optimization Principles and Methods; 3.1 - What is structural optimization?; 3.2 - How are optimization problems generally solved?; 3.3 - General optimization methods and principles; 3.4 - The curse of dimensionality; 3.5 - Convex programming and optimization; 3.5.1 - Linear programming; 3.5.2 - The Simplex method; 3.5.3 - Application to real-world engineering problems; 3.5.4 - Sequential linear programming; 3.6 - Gradient-based methods and line search methods; 3.6.1 - Gradient descent method
3.6.2 - MatLab example of gradient descent method