Object contacts simulated in animation software d:
While computational simulation of complex contact scenarios is critical for many computer graphics applications as well as engineering analyses, most simulation methods are synchronous and at odds with the triad of safety, correctness and progress. Since useful resolution of these scenarios still relies heavily on retroactively identifying physically plausible collision responses, such methods typically require careful parameter adjustment by the user. This technology represents a method for robust and realistic simulation of complex contact scenarios where user parameters do not affect safety, correctness and progress.

Computer simulation of object contact the deformation of curves and surfaces:
This technology uses a principled approach to simulate deformation of curves and surfaces in complex contact scenarios. It differs from current methods because it adheres to three guarantees: a) no interpenetrations of surfaces, b) obey causality, momentum- and energy-conservation laws, and c) completes processing in a finite time. This technology achieves these guarantees using a novel synthesis of existing methods comprising Asynchronous Variational Integrators (AVI), Kinetic Data Structures (KDS) and Discrete Penalty Layers.

Applications:
• Computer graphics (animation, virtual world, entertainment) - simulation of complex contacting objects in a 2-D or 3-D animation software package
• Engineering analysis (mechanical engineering, product development)
  a) Implementation in an existing finite element modeler to run in parallel to conduct safety analysis
  b) Preliminary testing of product designs incorporating many interconnecting and contacting parts (e.g. vehicle crash simulations)

Advantages:
• This technology ensures geometric safety, physical correctness, and computational progress, while other methods require carefully balancing safety and progress or even discard causality in favor of progress
• This technology removes the need to search for parameters which eliminate unrealistic results

Patent Status: Patent Pending

Licensing Status: Available for Licensing and Sponsored Research Support

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