International Journal of Engineering Applied Sciences and Technology, 2016
Vol. 1, Issue 7, ISSN No. 2455-2143, Pages 144-146
Published Online May - June 2016 in IJEAST (http://www.ijeast.com)

DYNAMIC SIMULATION AND MODELING OF PHYSICAL BEHAVIOR

Lokesh Kumar Shrivastav
Computer Science & Engineering, AMITY UNIVERSITY
Noida, Uttar Pradesh – 201303, India

I. INTRODUCTION

Simulations are abstractions of reality. It is defined as the mechanism of creating a model of an existing or proposed system (e.g., a project, a business, a mine, a watershed, a forest, the organs in your body) in order to clarify and understand those factors which control the system to predict the futuristic behavior of the system. Modeling is the representation of an object or phenomena, which is used by simulation. Modeling and simulation is a leading way that companies are reducing their development time while maintaining or increasing the quality of their products.

Some well-known simulation and modeling:

- Continuous simulation
- Discrete and combined simulation
- Differential inclusions in Modeling and Simulation.
- Computational fluid dynamics.
- Artificial Intelligence Techniques
- Multi-resolution and heterogeneous modeling

- Graphical Modelling
- Curve, surface, and manifold modeling
- Feature modeling, recognition, understanding
- Geometric Modelling
- Solid Modelling
- Hair Modelling
- Modelling of Natural Phenomena
- Sound simulation
- Simulation of natural phenomena
- Texture Models
- Physically-based modeling and simulation
- Human simulation
- Clothing simulation
- Shape modeling, synthesis, and analysis

II. WORKING

In many applications (prototyping and simulation, movies, games ...) the physically correct behavior of 3D objects is an important issue. This behavior should for example consider the dynamics of rigid bodies. Here objects can move through space, collide with each other and are liable to the laws of friction. Once one can simulate that, there is the possibility to add more degrees of freedom, e.g. object deformation by external and internal forces. With finite element methods these deformations can be handled in an efficient way. If we further increase the deformable character of the objects we may get materials like fluids or gases. Once all these phenomena can be handled, a next step would be to simulate the interaction between all these different matters. Our goal in this context one the one hand is to integrate as many of these physical effects as possible to gain maximum physical correctness and on the other hand we want do to this as fast as possible, i.e. in real time. Clearly there is a tradeoff between these goals. Desirable are algorithms which cover the whole range of application whereas the tradeoff between efficiency and precision can be controlled by a simple parameter.

III. CONCLUSION

Computer-simulation is the use of a computer to model the dynamic responses of one system by the behavior of another system modeled after it. A simulation uses a mathematical description mechanism, or model, of a real system in the form of a computer program. This model is composed of equations that duplicate the functional relationships within the real and feasible system. When the program is on run, the resulting mathematical dynamics form an analog of the behavior of the real system, with the results represented in the form of data. A simulation can also take the form of a computer-graphics image that represents dynamic processes in an animated sequence consequently.

Computer simulations are used to study the dynamic nature of objects or systems in response to conditions that cannot be easily or safely or truly applied in real life. For example, a nuclear blast can be explored by a mathematical model that incorporates such variables as heat, velocity, and radioactive emissions. Additional mathematical equations can then be used to feasible the model to adjust in certain variables, such as the amount of fissionable material that produced the blast. Simulations are especially useful in enabling observers to analyze and predict how the operation of an entire system may be affected by altering or modifying individual components within that system.

The simpler simulations performed by personal computers consist mainly of business models and geometric models. The former includes spreadsheet, financial and statistical software programs that are used in business analysis and planning. Geometric models are used for numerous applications that require simple mathematical modeling of objects, such as buildings, industrial parts, and the molecular structures of chemicals. More advanced simulations, such as those that emulate weather patterns or the behavior of macroeconomic systems, are usually performed on powerful workstations or on mainframe computers. In engineering, computer models of newly designed structures undergo simulated tests to determine their responses to stress and other physical variables. Simulations of river systems can be manipulated to determine the potential effects of dams and irrigation networks before any actual construction has taken place. Other examples of computer simulations include estimating the competitive responses of companies in a particular market and reproducing the movement and flight of space vehicles.

IV. REFERENCES

[1] A heterogeneous supercomputer model for high-performance parallel computing pedagogy
Wolfer, J. Global Engineering Education Conference (EDUCON), 2015 IEEE
Year: 2015

[2] An efficient Ray-triangle intersection algorithm for tunnel models
Fengyu Gao; Hongyan Qian Computer, Communication, Control and Information Technology (C3IT), 2015 Third International Conference on Year: 2015

[3] Ultrasound Volume Projection Imaging for Assessment of Scoliosis
Cheung, C.-W.J.; Zhou, G.-Q.; Law, S.-Y.; Mak, T.-M.; Lai, K.-L.; Zheng, Y.-P.
Medical Imaging, IEEE Transactions on Year: 2015

[4] Towards real-time interactive visualization modes of molecular surfaces: examples with udock
Levieux, G.; Montes, M.Virtual and Augmented Reality for Molecular Science (VARMS@IEEEVR), 2015 IEEE 1st International Workshop on Year: 2015

[5] GPU-Accelerated Digital Halftoning by the Local Exhaustive Search
Kouge, Hiroaki; Ito, Yasuaki; Nakano, Koji Parallel and Distributed Computing (ISPDC), 2015 14th International Symposium on Year: 2015

[6] RACB: Resource Aware Cache Bypass on GPUs
Hongwen Dai; Kartsaklis, C.; Chao Li; Janjusic, T.; Huiyang Zhou Computer Architecture and High Performance Computing Workshop (SBAC-PADW), 2014 International Symposium on Year: 2014

[7] Research on double negative materials by using FDTD method based on GPUs
Chen Shen; Xian-liang Wu Signal Processing, Communications and Computing (ICSPCC), 2014 IEEE International Conference on Year: 2014

[8] Post-Silicon Validation and Calibration of Hardware Security Primitives
Xiaolin Xu; Suresh, V.; Kumar, R.; Burleson, W.VLSI (ISVLSI), 2014 IEEE Computer Society Annual Symposium on Year: 2014

[9] A Generalization of the Scattering Transformation for Conic Systems
Polushin, I.G.Automatic Control, IEEE Transactions on Year: 2014

[10] Enhanced reading based on virtualization techniques
Demartini, C.; Sanna, A.; Lamberti, F.Consumer Electronics (ICCE), 2014 IEEE International Conference on Year: 2014

[11] Configuration-Based Optimization for Six Degree-of-Freedom Haptic Rendering for Fine Manipulation
Dangxiao Wang; Xin Zhang; Yuru Zhang; Jing Xiao Haptics, IEEE Transactions on Year: 2013

[12] Effective Classification of Microcalcification Clusters Using Improved Support Vector Machine with Optimised Decision Making
Jinchang Ren; Zheng Wang; Meijun Sun; Soraghan, J.Image and Graphics (ICIG), 2013 Seventh International Conference on Year: 2013

[13] Boundary Delineation of Breast Lesions in Series of 2D Sonography by Modeling the Spatial-Temporal Prior and Cell-Based MAP Approach
Jie-Zhi Cheng; Chung-Ming Chen; Yi-Hong Chou; Wen-Huang Cheng Image and Graphics (ICIG), 2013 Seventh International Conference on Year: 2013

[14] A Multi-Criteria Approach to Camera Motion Design for Volume Data Animation
Wei-Hsien Hsu; Yubo Zhang; Kwan-Liu Ma Visualization and Computer Graphics, IEEE Transactions on Year: 2013

[15] Formable object — A new haptic interface for shape rendering
Klare, S.; Forssilow, D.; Peer, A.World Haptics Conference (WHC), 2013 Year: 2013

[16] Soft Real-Time Scheduling in Google Earth
Erickson, J.P.; Coombe, G.; Anderson, J.H.Real-Time and Embedded Technology and Applications Symposium (RTAS), 2012 IEEE 18th Year: 2012

[17] Real-time human object motion parameters estimation from depth images
I-Chung Tsao; Chung-Lin Huang Pattern Recognition (ICPR), 2012 21st International Conference on Year: 2012

[18] Research on Parallel Algorithm of Salient Features Extraction for Nature Scene Recognition
Wang Lu; Wu Zhigang; Cai Zixing Computer Distributed Control and Intelligent Environmental Monitoring (CDCIEM), 2012 International Conference on Year: 2012

[19] Infographics at the Congressional Budget Office
Schwabish, J.A.Visual Analytics Science and Technology (VAST), 2012 IEEE Conference on Year: 2012

[20] Generation of basic emotions for virtual human in the virtual environment
Shi Lin; Li Zhigang Electrical & Electronics Engineering (EEESYM), 2012 IEEE Symposium on Year: 2012