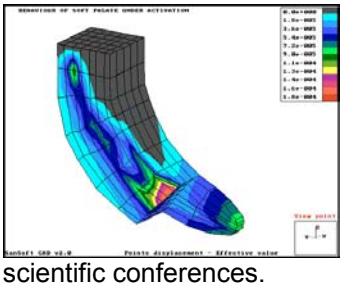
ITC Software

Development of Scientific Software in Bioengineering

Development of scientific software for use in medicine, bioengineering and bioinformatics.

The evolution of computer and software technology today provides the basis for the development of computer methods and software for simulations, i.e. virtual presentation of biological processes and bio-systems response. This bioengineering software incorporates fundamental laboratory and clinical investigations, together with computational methods and modern software, giving a tool for new discoveries in science and medicine for practical applications.

We have developed software for the modeling complex phenomena in solid and fluid mechanics, heat and mass transfer and coupled physical fields. The specific computational methods and software for biosystems are accompanied by laboratory investigations and laboratory equipment design. The results of this research have been published in a number of articles in world leading scientific journals, and reported at world scientific conferences.

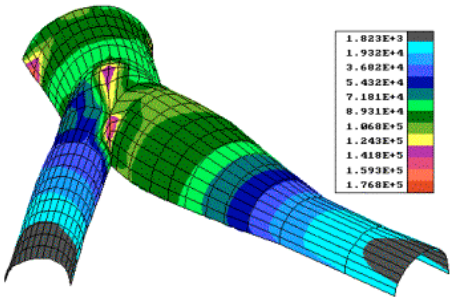


ITC offers the current software, as well as participation in interdisciplinary scientific projects for the development of computational methods and software for biosystems and bioprocesses; specifically in simulation of blood flow, blood vessel deformations, heart modeling, vein graft modeling, including plaque development and growth, modeling related to cartilage and muscle mechanics, platelet deposition and activation, air flow in the alveolated systems with particle tracking particle deposition simulations, or modeling of the design of delivery devices.

The specific software for a problem is designed (some of which are specified as possible projects) to be user-friendly, transparent and easy to use in laboratory investigations and in medical practice, with a direct connection to other measurements such as ultra-sound recording, or interactive work in measurements and simulations. Examples of the software are: virtual carotid artery bifurcation, virtual plaque growth and artery remodeling, virtual vein graft solutions, virtual alveolated system flows, and the virtual cell.

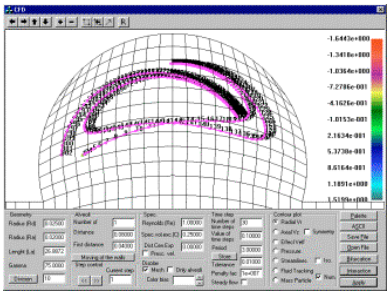
IMPORTANCE OF SIMULATIONS IN BIO-SYSTEMS

Creating software to simulate bio-systems' responses and bio-system processes lead to better understanding of the complex phenomena in this still unexplored area. Reliable numerical simulations can **provide a great value in designing suitable diagnostic and treatment procedures.** Also, the creation of tools for virtual reality in this field will **save very expensive experimental and trial-and-error procedures in biomedical and pharmaceutical research.** Today's stage in this field can be compared with engineering design in the 60's: Aerospace or automobile industries were developing new



models by very expensive and time consuming testing, while today, with modern computational tools, extensive, fast and inexpensive simulations are first performed, and then the practical design follow.

However, such simulations are complicated and extremely challenging, and are becoming possible with the use of powerful parallel computing facilities. An example of the complexity of the methods and software development is to simulate a drug-flow pathway induced by an injection, in order to determine if the drug can be transported to the desired regions. The simulation includes a flow solution with the diffusion processes, and the drug trajectory. Or, the effectiveness of the various surgical procedures can be evaluated a priori through simulations which show the effects of the surgical intervention (e.g. in using grafts to bypass critical regions of blood vessels).



Simulations are essential for the design of micro-devices for biomedical applications. Manufacturing process complexity and costs require extensive modeling to establish system performance and identify critical parameters early on in the design sequence.

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ITC Software is an advanced technology solutions provider, focused on the commercial and scientific markets.

The company has resources of over 260 IT professionals and scientists, located in the Americas, Europe, Russia and India. ITC Software can provide 24 hour project development and support, and ISO 9001 procedures.

Some of our references ...

Guy's and St. Thomas's Medical and Dental School, UK

Harvard University, USA

University of Kragujevac, Federal Republic of Yugoslavia

Massachusetts Institute of Technology

Technical University of Athens, Greece

Russian Academy of Sciences, Russia

University of Tuebingen, Germany