

## **“System Dynamics Modeling in Science and Engineering”**

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### **Abstract of Conference**

System dynamics modeling is a user-friendly approach to modeling and simulation of dynamical systems. It is best known for applications in social sciences and management. However, system dynamics tools are just as useful for solving initial value problems in science, medicine, and engineering.

In this talk I would like to show that system dynamics modeling is simple, natural, practical, and fun. It makes use of simple tools and a powerful yet simple metaphor for representing processes. This metaphor is a most natural element of human thought and creativity. SD modeling is practical because it allows users to quickly cycle between experiments and models. This is important in any form of design activity and in learning. In short, system dynamics makes for a fun approach to dynamical systems in science and engineering, useful in everything from education to real life engineering applications.

### **Topics Covered in Workshop**

- Introduction to system dynamics modeling using a simple example from fluids.
- Typical fluid processes in SD models.
- Analogous electrical circuits.
- The windkessel model.
- Application to the systemic circuit.
- Electric windkessel circuits and data.
- Finite elements applied to the aorta.
- Introduction of hydraulic induction in models.
- Hydraulic and electric oscillations.
- Application to the systemic circuit.
- Structure of system dynamics models.
- Numerical methods.