2007 Western MultiConference on

Modeling & Simulation (WMC '07)

2007 High Level Simulation Languages and Application Conf.

Mon., Jan. 15, 2007 at 3:30 p.m.

Catamaran Resort Hotel, San Diego, CA

Session Chair:

Pieter J. Mosterman

Panel Session:

Model Component Standardization and Certification

Panel Members:

Roy Crosbie
Jeffrey Fong
Terry Ericsen
Wen Jen Lee
Pedro Marcal

Date of Presentation:

Jeffrey T. Fong, fong@nist.gov
NIST
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

Session Abstract

With the advance of Model-based Design, an appealing business paradigm is to replace the hardware by **computational models** that represent a data sheet of the hardware component.

This requires the **computational model** to faithfully represent the (hardware) behavior given a certain accuracy.

As such a **standardization** of the behavior and the **range of validity** of the (hardware) behavior is an important task.

Because a variety of high-level languages may be employed to design the computational model, it is important that different models all perform according to the **standardized behavior**.

To provide **confidence** in the correct implementation of a computational model, the model has to be **certified** to perform according to the standard.

Jeffrey T. Fong, fong@nist.gov NIST
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

Panel Session:

Model Component Standardization and Certification

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Session Goals:

1. Explicate the **needs** to enable a business paradigm where **computational models** are provided by suppliers, rather than hardware components.

2. Identify a **framework** in establishing an **international advisory board** (a) to **provide** an **accredited library** of components for standardization, and (b) to **certify** **benchmark computational models.**

(more)

Jeffrey T. Fong, fong@nist.gov
NIST
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Session Goals - *(Continued)*

3. Provide a **forum** for further exchange of information on:

   3a. **Availability / accessibility** of the library and **copyright issues**.

   3b. Establishing **test suites** to achieve coverage of **model functionality**.

Jeffrey T. Fong, fong@nist.gov
NIST
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

Panelist

Jeffrey Fong

Title & Affiliation

Physicist & Project Manager

Mathematical & Computational Sciences Division

U. S. National Institute

of

Standards and **Technology**

(NIST)

Jeffrey T. Fong, fong@nist.gov
NIST
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

Question:

What is NIST ?

NIST products and services

- Assistance to small manufacturers
- Calibrations
- Computer Security Resource Center
- Databases
- Laboratory accreditation
- Measurement & standards research
- NIST Research Library
- Publications
- Quality guidelines
- R&D funding
- Software
- Standard Reference Materials
- Standards
- Weights and measures

Jeffrey T. Fong, fong@nist.gov
NIST
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

Question:

What are NIST Standards ?

- **Standards and Regulatory Information**
  - IR 7241: NIST in the CFR
  - Laws
  - Legal Metrology
  - Standards and Trade
  - Standards Coordination and Participation in Standards Activities
  - Standards Information
  - Standards Referenced in Regulations
  - Standards Resources for NIST Staff NIST STAFF ONLY
- **Conformity Assessment/Accreditation**
  - Conformity Assessment Information
  - Telecommunications Certification Bodies Program
  - Laboratory Accreditation (NVLAP)
  - Metrology Resources for Government and Commercial Laboratories
  - Mutual Recognition Agreements (MRAs)
  - National Cooperation for Laboratory Accreditation
  - National Voluntary Conformity Assessment System Evaluation (NVCASE) Program
- **Information Technology Standards**
- **Training and Workshops**
  - Measurement Training
  - SABIT Workshops for Russia/NIS Officials
  - Standards in Trade (SIT) Workshops
  - Training Materials
- **Physical Measurement Standards/Metrology**
  - Calibrations
  - International Metrology
  - NIST Scientific and Technical Databases
  - Physical Reference Data
  - Standard Reference Materials (SRM)
  - Weights and Measures Division

Jeffrey T. Fong, fong@nist.gov NIST
National Institute of Standards and Technology
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Question:

What are NIST Calibration Services ?

NIST Calibration Services Users Guide
NIST Special Publication 250 (NIST SP 250)

- Dimensional
- Electromagnetic
- Ionizing Radiation
- Mechanical
- Optical Radiation
- Thermodynamic
- Time and Frequency
- SP 250 Appendix Fee Schedule (2006)

Calibration Related Publications

- Experimentation and Measurement
  The link shown above is a PDF document. To view and p
  required.
- SP 250 Series on Measurement Services

Standards Related Links Outside of NIST

- Federal and Non-profit Organizations
- National Metrology Laboratories
- National Standards Bodies
- Science.gov

Jeffrey T. Fong, fong@nist.gov
NIST
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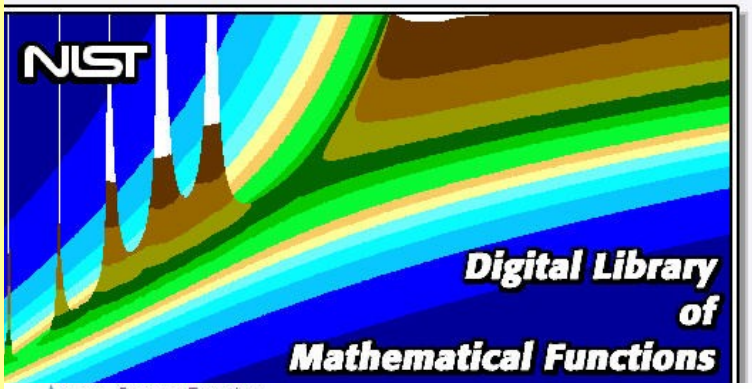
What is NIST Software ?

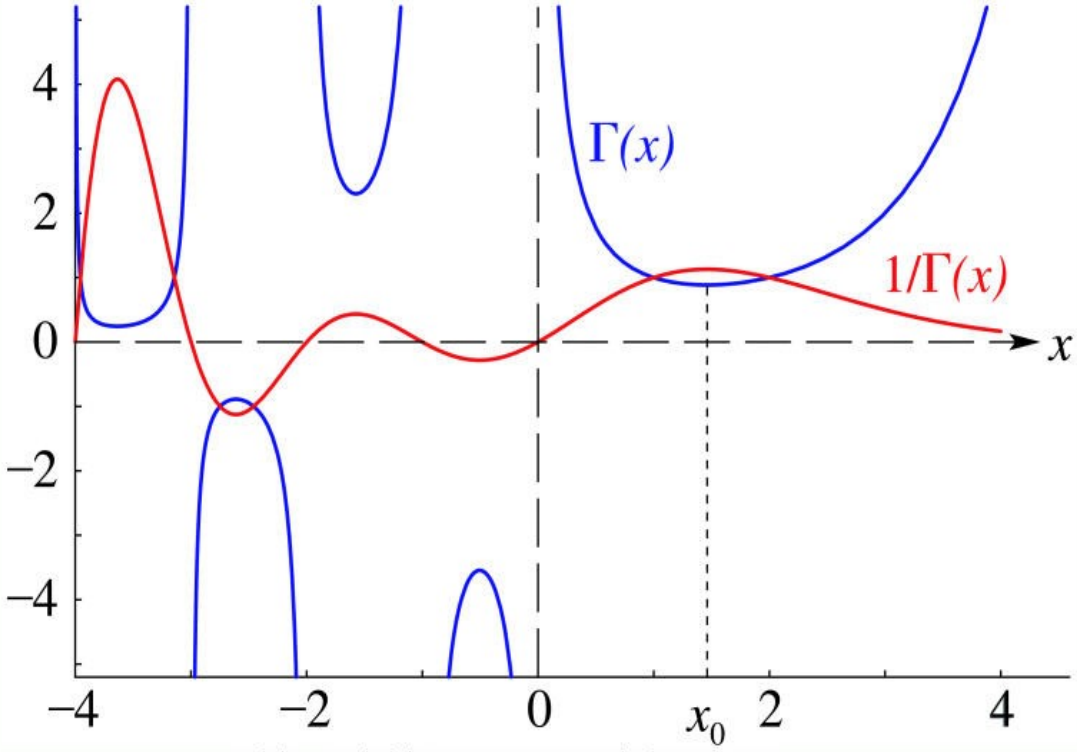
- Building Economic Analysis--for analyzing life-cycle building costs and choices among new technologies.
- CONTAM 2.4 —CONTAM is multizone airflow and contaminant transport analysis software.
- Cement and Concrete Modeling Programs--links to software programs that model the structure and properties of cement-based materials.
- Conformance Test Suite Software--testing measures whether a product faithfully implements an information technology specification.
- Dataplot--multiplatform software system for scientific visualization, statistical analysis, and non-linear modeling.
- Expect Software--tool for automating interactive applications such as telnet, ftp, pass, fsck, rlogin, and tip.
- EXPGUI--multiplatform graphic user interface for the GSAS crystallographic software package
- Fire Modeling Programs--links to a variety of fire simulation programs.
- Guide to Available Mathematical Software (GAMS)--a cross index and virtual repository of mathematical and statistical software components of use in computational science and engineering.
- Interoperable MPI web site and conformance tester--enables two or more implementations of the Message Passing Interface to interoperate within a single application.
- MOIST predicting heat and moisture in building envelopes.
- NIST Parallel Applications Development Environment (PADE)--facilitates development of parallel applications for heterogeneous networked computers.
- Smoke Plume Modeling/ALOFT-FT--predicts the downwind distribution of smoke particulate and combustion products from large outdoor fires.
- Synchronize your computer's clock to the correct time:
  - dial-up service--Automated Computer Time Service
  - via the Internet--Network Time Service

An Example of

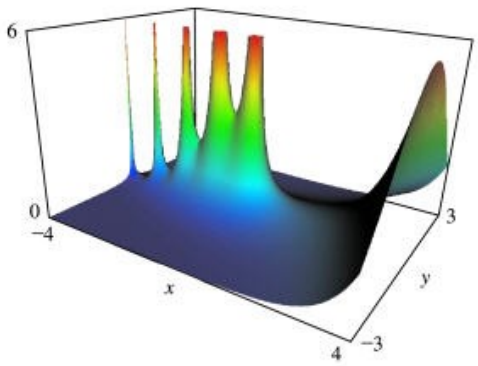
NIST Software



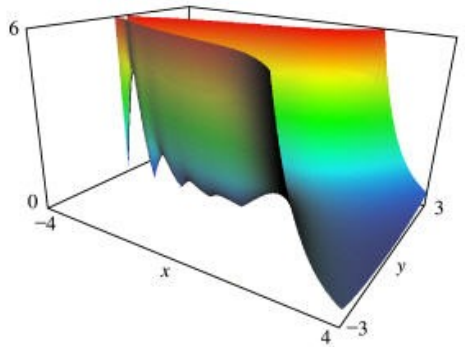
Ch.GA. Gamma Function
Properties
§GA.3. Graphics



GA.3.1 $\Gamma(x)$ and $1/\Gamma(x)$. $x_0 = 1.46\ldots$, $\Gamma(x_0) = 0.88\ldots$; see §GA.4(iii).



GA.3.4 $|\Gamma(x+iy)|$.
3D Visualization (Help)



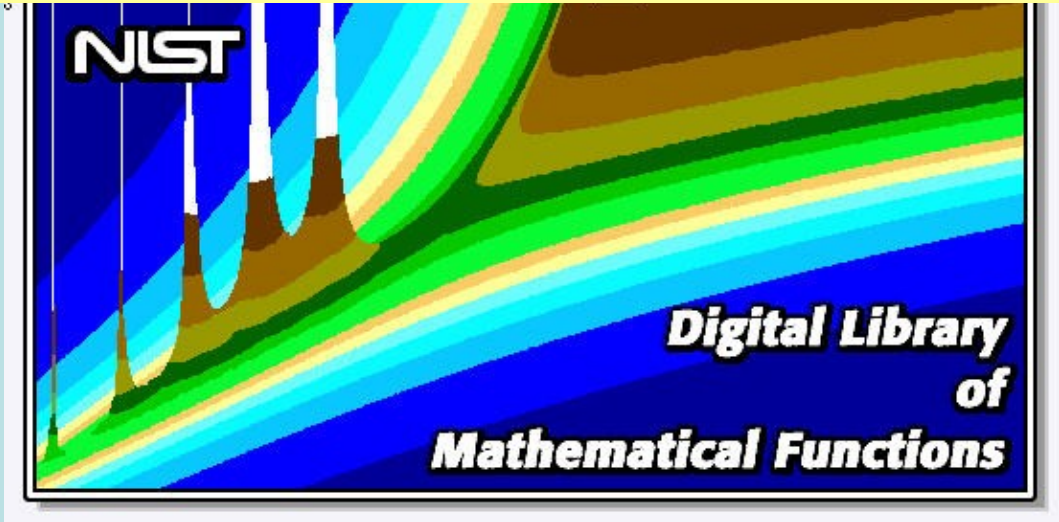
GA.3.5 $1/|\Gamma(x+iy)|$.
3D Visualization (Help)

Jeffrey T. Fong, fong@nist.gov
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

An Example of

Mathematical Software Component Standardization and Certification

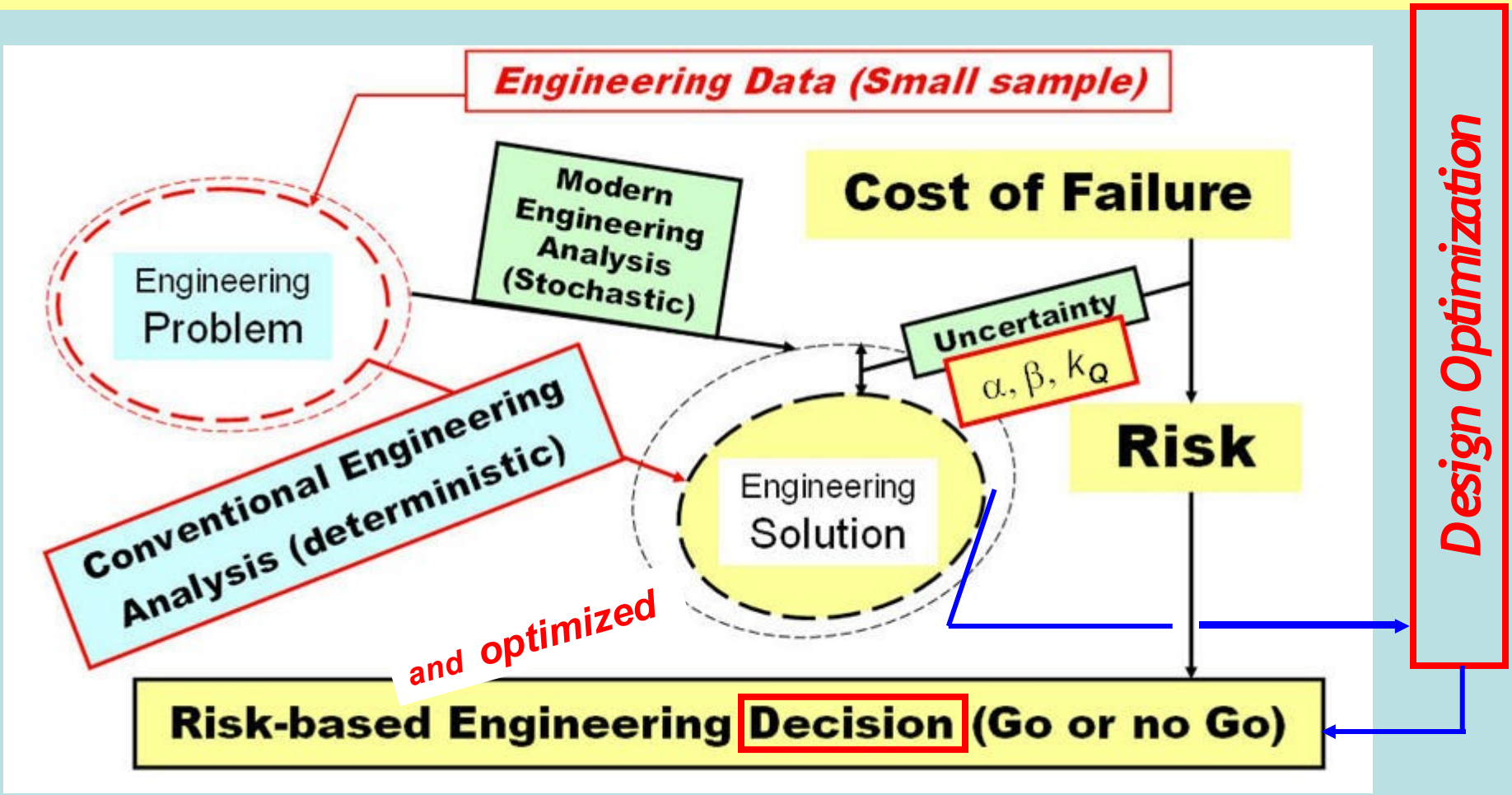
at NIST *(Research in progress)*



Jeffrey T. Fong, fong@nist.gov
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

An Example of

Finite Element Method-based Software Component Benchmarking, and Uncertainty Estimation at NIST *(Research in progress)*



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Observations

Disclaimer: *The views expressed here are those of the panelist and* ***not*** *of the institutions with which he is affiliated.*

*Session Goal 1 (**Needs**) is feasible.*

*Session Goal 2 (**IAB** Framework) is difficult, time-consuming but feasible.*

*Session Goal 3 (**Forum**) is feasible.*

Jeffrey T. Fong, fong@nist.gov
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

Bio: ***Jeffrey T. Fong***

M.S. (Eng. Mech.), Columbia University.

Ph.D. (Appl Math & Mechanics.), Stanford.

NIST *(1966 – present), Adjunct Professor of Statistics and Structures, Drexel Univ.*

Fellow ASTM; F. ASME; P.E. (New York).

Email: ***fong@nist.gov*** ***Tel.*** *(301) 975-8217*