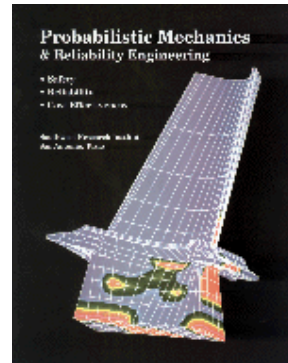


Probabilistic Mechanics and Reliability Engineering

概率力学及可靠性工程

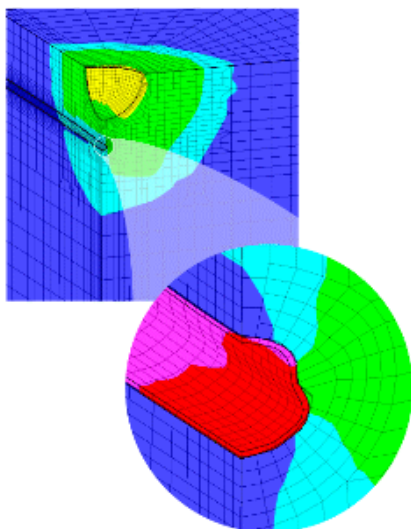


In today's market-driven environment, industry must develop high-performance, low-cost products that meet increasing reliability requirements and safety standards, under stringent time and resource constraints. For the past decade, Southwest Research Institute (SwRI) has pioneered the integration of state-of-the-art reliability methods and failure models to develop faster, better, and cheaper ways to design, manufacture, and maintain engineering systems. The Institute develops reliability technology to:

- Quantify reliability and safety
- Identify key variables
- Integrate cost and risk assessments into engineering decisions

在当今以市场为驱动的环境下，在紧迫的时间和资源限制下，工业界必须开发高性能的、低费用的产品以满足不断增长的可靠性需求和安全标准的要求。在过去的十年中，美国西南研究院倡导了以一流的可靠性方法和失效方法的结合，开发快速地、更好地方法来设计、生产并维护工程系统，美国西南研究院开发的可靠性技术如下：

- 量化可靠性和安全性
- 明确关键变量
- 结合费用和风险评估进行工程决策



Coupling an explicit dynamic finite element program with SwRI probabilistic analysis software, engineers determine the probability that an underground tunnel or its contents would survive above-ground blasts. The Institute specializes in interfacing probabilistic methods with a variety of finite element programs, such as NASTRAN, ABAQUS, ANSYS, PRONTO, and DYNA.

使用美国西南研究院概率分析软件和外在的有限元程序，工程师对一种地下通道及其内容，确定发生地面爆炸时的完好概率。美国西南研究院专攻和多种有限元程序交互的概率，例如 NASTRAN, ABAQUS, ANSYS, PRONTO, and DYNA。

As a leader in developing and applying probabilistic methods, SwRI uses this technology to resolve complicated engineering reliability problems. Teams integrate engineering mechanics and reliability expertise to solve problems using:

- Mechanistic and empirical performance/failure models
- Reliability models
- Statistical data analysis
- Computer-based probabilistic risk assessment and design optimization
- Risk-based decision analysis
- Probabilistic analysis software
- Application-oriented, tailored probabilistic analysis codes
- Methodology review and development

作为开发和应用概率方法的一个领先者，美国西南研究院使用这项技术解决复杂工程的可靠性问题，我们的团队结合了工程力学和可靠性的专业技术，解决实际问题，使用的技术如下：

- 机械力学的和经验理论的性能/失效模型
- 可靠性模型
- 静态数据分析

- 以计算机为基础的概率风险评估和设计优化
- 以风险为基础的决策分析
- 概率分析软件
- 应用指南，量身定做的概率分析代码
- 方法论描述和开发

SwRI has applied reliability analysis and risk assessment in a number of technology areas. Applications include:

- Aerospace propulsion systems
- Aircraft
- Automotive structures
- Biomechanics
- Gas turbines
- Geomechanics
- Nuclear waste packaging
- Offshore structures
- Pipelines
- Rotordynamics

美国西南研究院已经将可靠性分析和风险评价技术应用在很多的技术领域，

这些领域包括：

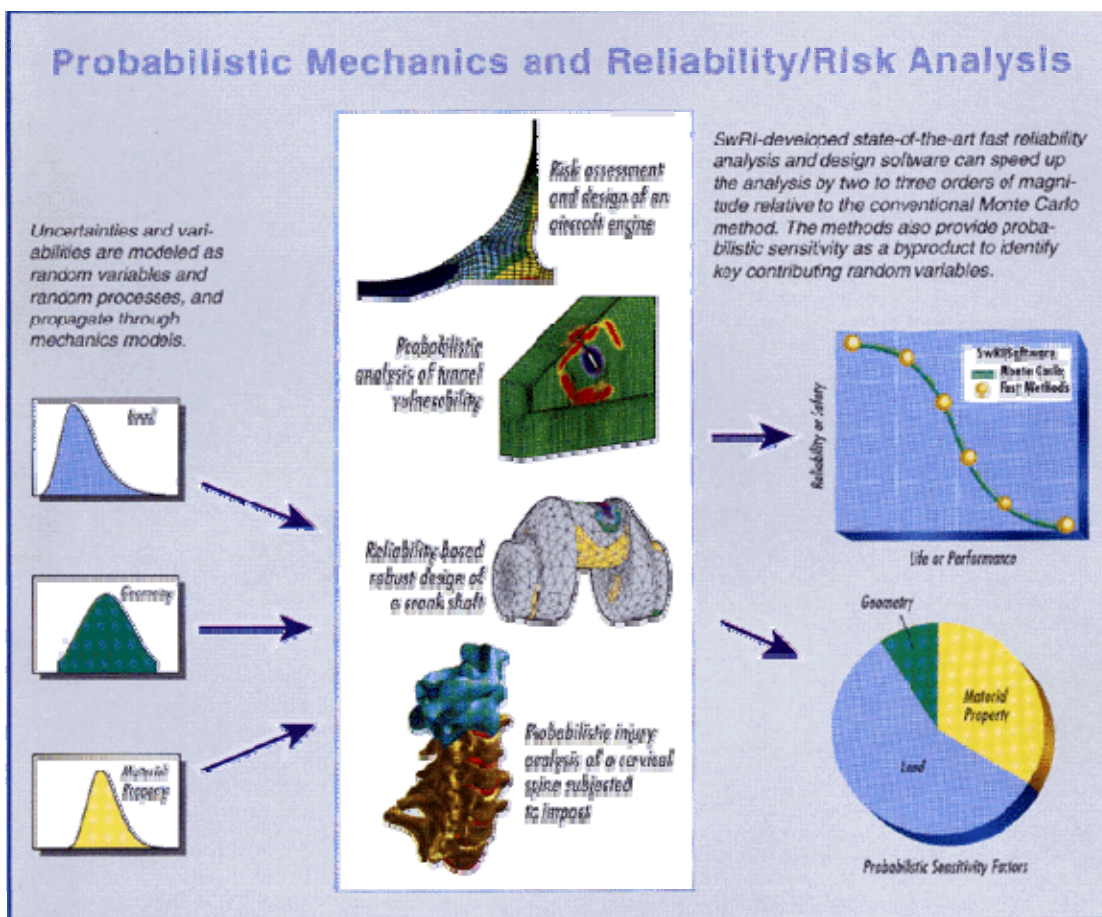
- 航天器推进系统
- 飞机
- 汽车结构
- 生物材料
- 燃气轮机
- 地质力学
- 核废物封填
- 滩海结构

- 管道
- 动平衡

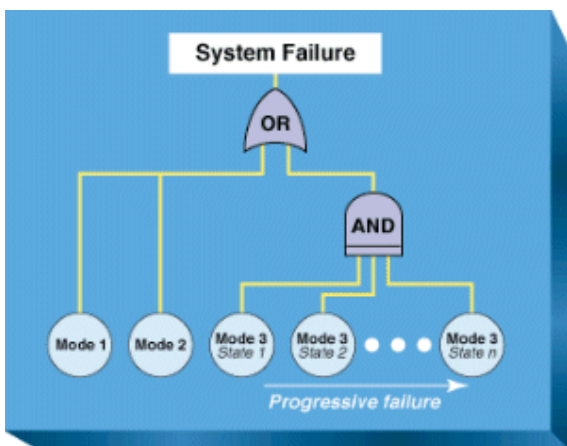


Institute engineers develop and use probabilistic analysis tools to solve reliability problems. The NESSUS software, for example, is a general-purpose probabilistic analysis code that couples commercial finite element codes such as ABAQUS, ANSYS and NASTRAN with powerful and efficient probabilistic analysis methods.

美国西南研究院工程师开发使用概率分析工具解决可靠性问题，NESSUS 软件是一种通用目的的概率分析程序，可以与商业化有限元软件如 ABAQUS, ANSYS 和 NASTRAN 结合使用，具有强大而高效的概率分析能力



Structural system failures involve multiple failure modes, locations, and components that are statistically dependent due to common loads, temperatures, and manufacturing processes. To compute efficiently and accurately the reliability of structural systems, SwRI developed a probabilistic fault tree analysis method that takes into account the correlations and dependencies.



结构系统失效涉及到多种失效模式、失效位置及失效部件，而这些统计结论都是依靠常见的载荷、温度及制造工艺，对于结构系统计算的效率和准确度，美国西南研究院开发了一种概率故障树分析方法，能够深入考虑

其相关性和从属关系。

The SwRI-developed risk assessment computer code [NESSUS](#) integrates highly efficient reliability methodology with finite element analysis using minimal computational time. Through tailored interfaces, NESSUS has been integrated with client in-house programs and several commercial finite element codes. The Institute licenses probabilistic analysis software and offers education in the use and application of probabilistic methods and software through [short courses](#) and computer workshops.

美国西南研究院开发的风险评价计算机软件—[NESSUS](#)—使用最少的计算时间，利用有限元分析整合了高效率的可靠性方法，通过精心制作的界面，NESSUS 软件结合了用户编程和几种商业有限元代码的功能。西南院发放概率分析软件的使用许可号，提供在概率计算方法及软件使用方面的短期培训及计算机课程。

更多的信息请您联络美国西南研究院北京代表处李金武，北京朝阳区东三环北路8号亮马河大厦1座1303室，电子邮箱：jinwu.li@swri.org 手机：13911774667，电话：010-65906391-805，传真：010-65906392