* Home (Intro, link to history)

Intro:

How to account for uncertainties in engineering structures? Actions on structures such as wind, earthquake, machinery vibrations, as well as the capacity of structural elements, the materials properties and the geometry of structure can fluctuate randomly.

Probabilistic analysis via structural reliability methods is the answer!

Developed and tested for more than 20 years of research in the field of structural reliability at the Technical University of Munich, our software product STRUREL is the indispensable tool for effective and safe engineering computations.

Send a request for the trial version of Strurel today! Try the effectiveness of the state-of-the-art tools for structural safety.

* Strurel

Strurel is one of the most complete software for probabilistic modeling in structural engineering. It offers the state-of-the-art structural reliability computational methods.

The definition of the probabilistic model is fast and efficient with Strurel:

The user friendly graphical interface and the ad-hoc interpreter guide the user to run the probabilistic analysis and to process the results.

STRUREL is the commercial name of a suite of programs for structural reliability with over 20 years of development. STRUREL users include a number of international leading companies in structural, geotechnical and mechanical engineering. The suit includes the a basic module COMREL and three modules COMREL-TV, SYSREL and STATREL.

COMREL: is the main software for time invariant reliability analysis of components. Read more (if clicked the following text appears)

COMREL performs time-invariant reliability analysis of individual failure modes based on advanced FORM/SORM methodology. Several algorithms to find the most likely failure point (β-point) are implemented including a gradient free algorithm for non-differentiable failure criteria (state functions). Complementary or alternative computational options are Mean Value First Order (MVFO), Monte Carlo simulation, Adaptive Sampling, Spherical Sampling, several Importance Sampling schemes and Subset Simulation.

FORM/SORM techniques allow to compute a rich set of sensitivity measures showing the impact on reliability of individual basic random variables, of distribution parameters and of other constant parameters. Provided characteristic values are specified partial safety factors for all basic variables are another straightforward result.

COMREL can deal with arbitrary dependence structures in the stochastic model (Rosenblatt, Hermite and Nataf-models). The full set of stochastic models offered by STATREL is supported (44 models at present) and can be inputted either in parameter form or in terms of the first two moments and additional parameters if necessary. The models can be truncated and new user defined models can be added. You can make distribution parameters dependent on other variables, parameters and even functions. Dependencies can also be described in terms of correlations when this is theoretically admissible. The increased versatility in stochastic modeling certainly is one of the strength of COMREL/SYSREL.

In COMREL several failure criteria can be defined in one job. Alternatively one may use “Archives” of stochastic models and state functions connected to predefined "Reliability Processors".

State functions can be either easily implemented in the Graphical User Interface or called from external programs. State functions can be specified in normal mathematical notation. Names for variables and parameters can be chosen freely and are automatically transferred into the stochastic model and vice versa. Important constants are predefined. Built-in functions include all elementary, trigonometric, hyperbolic, logarithmic and some special functions like the Gaussian distribution function and its inverse, Bessel and Gamma functions. Several alternatives for numerical integration, differentiation and root finding are available as well as comparative operators and test functions. Auxiliary user defined functions and reference functions can be defined.

COMREL-TV is the software module for time-variant reliability analysis.

Read more (if clicked the following text appears)

Time-variant reliability is computed by the outcrossing approach also based on FORM/SORM methodology for stationary or non-stationary cases. Available random process models are regular or intermittent rectangular wave processes and differentiable Gaussian and non-Gaussian translation processes (Hermite or Nataf processes). Both models can be scalar processes and vector processes. All random process types can be combined with each other including the possibility to combine intermittent and non-intermittent processes. Sensitivity measures and partial safety factors are provided similar to time-invariant analysis. In addition, various other exceedance measures like excursion time, hazard rate and point-in-time non-availability are evaluated.

• SYSREL: A software module for reliability analysis of systems.

Read more (if clicked the following text appears)

SYSREL covers system reliability evaluation including event updating. The graphical user interface offers easy and efficient way to define the model. The logical model in SYSREL is connected with the failure criteria and the stochastic model (basic random variables) for a fully interactive control. System modeling includes not only the representation by a (minimal) set of parallel systems in series but also the important case of conditional events (observations, event updating).

For the FORM/SORM methods SYSREL is based on, you have access to several efficient and reliable algorithms searching for the β-point (most likely failure point) with special solution strategies. An alternative computational option is Monte Carlo simulation.

STATREL: A module for the reliability-oriented statistical analysis of data including simulation and analysis of time series.

Read more (if clicked the following text appears)

STATREL is a program with many special features for statistical reliability-oriented data analysis but also covers standard statistical analyses. It provides a useful set of illustrative to perform basic descriptive statistics with many graphical facilities.

For all models included in other STRUREL modules STATREL performs parameter estimation by different methods, confidence interval and quantile estimation as well as hypothesis testing including tests for sample validity, distribution functions and parameters. Simple analysis of variance and regression is also included. Several Bayesian methods are implemented.

Results are made visible in terms of numerous graphical representations such as histograms, cumulative frequencies, bivariate plots, bar charts, probability paper plots. Import of data from spreadsheet programs like Excel and export of stochastic models to COMREL and SYSREL is possible.

Schemes for simulation of random numbers, random vectors and random time series (stationary, non-stationary, Gaussian, Hermite) allow numerical experiments. Different generation techniques such as ARMA or by simple and fast Fourier transforms can be used. Many predefined spectra can be selected and various forms of non-stationarities can be defined.

The implemented features for time series analysis provides rich tools for setting up and testing models. The features include numerous graphical representations of the time series such as histograms, probability paper plots, scatter diagrams, moving averages, Husid functions, mean value crossings and periodograms. Many transformation and filter techniques including trend removals, smoothing, differentiation and integration, amplitude and frequency modulation are provided. Non-parametric spectral estimation and ARMA modeling as well as amplitude and frequency trend estimation are available.

* Trial version [submit form]

Want to try the power of STRUREL? Fill in the request for a trial version and you will receive an e-mail with the link to download the software.

Name

Surname

Title

Institution

e-mail address\*

\* you agree AGB (to discuss)

Please select the fields which better apply to your interest

Building Design

Bridge Design

Tunnel Design

Mechanical Devices

Electrical Devices

Automotive

Environmental Engineering

Nuclear Engineering

Fracture Mechanics

Population Dynamics

Biology

Naval Design

Maritime Design

Offshore Structure

Earthquake Engineering

Wind Engineering

System Dynamics

* Sales (pricing, order forms, contact info)

Prices in EURO V.A.T excluded

|  |  |  |  |
| --- | --- | --- | --- |
| Module | Commercial Use | Academic Use | For Students |
| **COMREL 9** | 2900,- | 1740,- | 290,- |

|  |  |  |  |
| --- | --- | --- | --- |
| **COMREL TV** | 1000,- | 600,- | not available |
| **SYSREL** | 1500,- | 900,- | 150,- |
| **STATREL** | 500,- | 300,- | not available |

Order STRUREL sending a purchase order

click purchase order opens struorder-e.pdf

Any questions? Contact us (open e-mail link addressed to orders@strurel.de)

* Education (literature, some examples, offer possibility of courses/support)

Breitung, K.: Asymptotic Approximations for Probability Integrals, in: Prob. Eng. Mech. 4, 4 (1989), pp. 187-190

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**B. Application notes on *STRUREL***  
  
  
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* About us (history-link to ERA about Rackwitz, RCP/Eracons a few sentences on consulting and link to Eracons, mention people involved, link to ERA group, consulting)

RCP GmbH is an independent consultant specialized in reliability and risk analysis of technical systems. RCP owns and further develops the software STRUREL.

ERACONS GmbH (link to www.eracons.com) develops software solutions for incorporating probabilistic, reliability and sensitivity analysis in engineering models. Moreover, we provide specific tailored-made software for the industry, advanced consulting and training.

ERACONS is active in the continuing development of the STRUREL software implementing the state-of-the-art methods in structural reliability. We also provide specific solutions for integration between STRUREL software and other engineering software (such as FEM programs). Example of our current integration is a SOFiSTik (www.sofistik.de) plug-in for the definition of the stochastic model which is then solved through STRUREL.

Contact us for any further question! Write an email to:

info@eracons.com

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Registernummer: HRB 204916

Some examples

Ariane 5 (picture + one sentence)

http://commons.wikimedia.org/wiki/Category:Ariane\_5

Storebelt Cable bridge

http://commons.wikimedia.org/wiki/Storeb%C3%A6ltsbroen