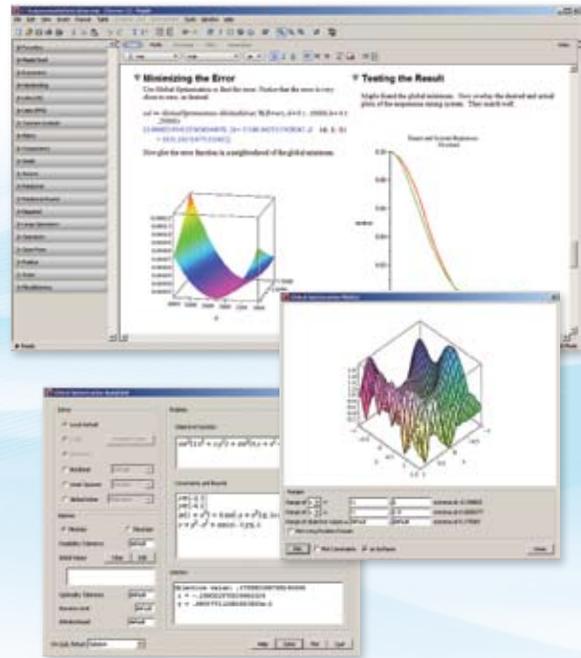


Maple Global Optimization Toolbox

Optimization is the science of finding decisions that satisfy given constraints, and meet a specific goal at its optimal value. In engineering, constraints may arise from physical limitations and technical specifications; in business, constraints are often related to resources, including manpower, equipment, costs, and time.

The objective of global optimization is to find the “best possible” solution in nonlinear decision models that frequently have a number of sub-optimal (local) solutions. Multi-extremal optimization problems can be very difficult. To obtain a high quality numerical solution, a global “exhaustive” search approach is necessary. In the absence of global optimization tools, engineers and researchers are often forced to settle for feasible solutions, often neglecting the optimum values. In practical terms, this implies inferior designs and operations, and related expenses in terms of reliability, time, money, and other resources.

Using the Global Optimization Toolbox, you can formulate optimization models easily inside the powerful Maple numeric and symbolic system, and then use world-class optimization technology to return the best answer robustly and efficiently.



“The Global Optimization Toolbox for Maple provides a widely applicable, fully integrated development environment that can support control engineering applications and help realize the significant potential that global optimization has as a valuable tool in control system design.”

Dr. Didier Henrion
LAAS-CNRS, Toulouse, France

Key Features

- Incorporates the following solver modules for nonlinear optimization problems.
 - Branch-and-bound global search
 - Global adaptive random search
 - Multi-start based global random search
 - Global solution further refined by local search using the reduced gradient method
- Solves models with thousands of variables and constraints.
- Solvers take advantage of Maple arbitrary precision capabilities in their calculations, to greatly reduce numerical instability problems.
- Supports arbitrary objective and constraint functions, including those defined in terms of special functions (for example, Bessel, hypergeometric), derivatives and integrals, and piecewise functions etc. Functions can also be defined in terms of a Maple procedure rather than a formula.
- Interactive Maplet™ assistant for easy problem definition and exploration.
- Built-in model visualization capabilities for viewing one or two-dimensional subspace projections of the objective function, with visualization of the constraints as planes or lines on the objective surface.

Application Areas

Global optimization problems are prevalent in systems described by highly nonlinear models. These areas include:

- Advanced engineering design
- Econometrics and finance
- Management science
- Medical research and biotechnology
- Chemical and process industries
- Industrial engineering
- Scientific modeling



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