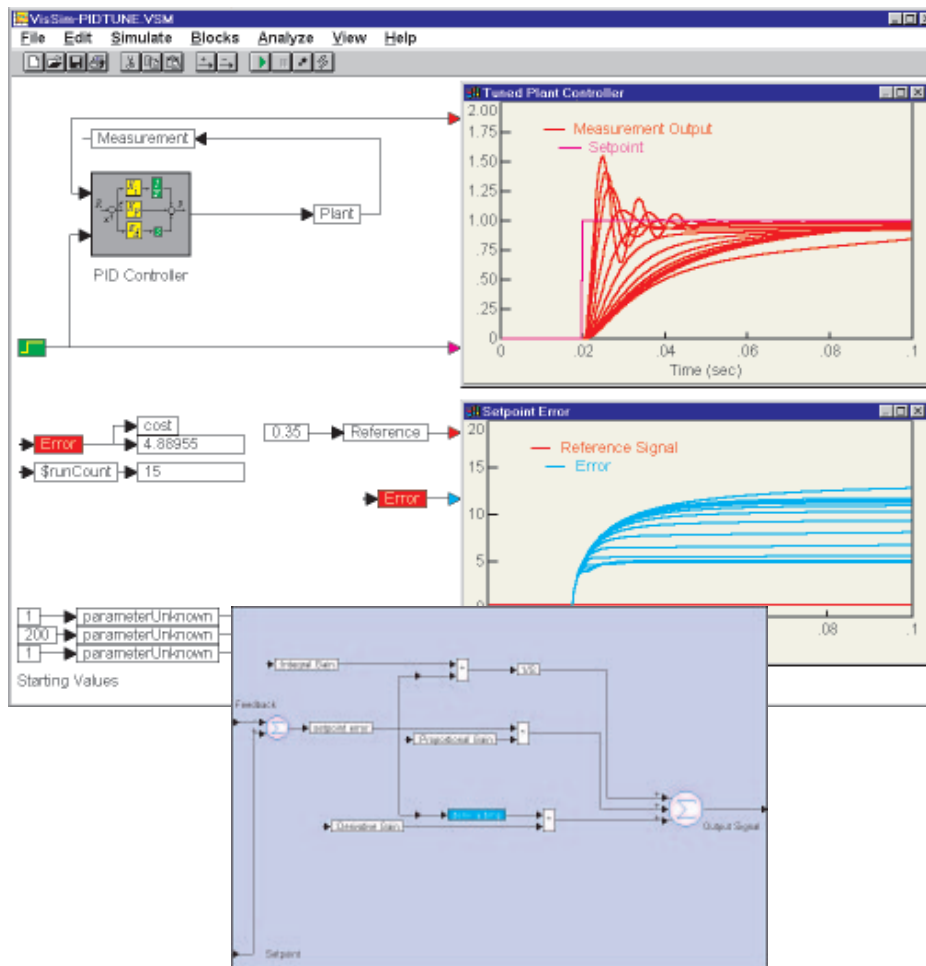


VisSim/OptimizePRO calculates optimal values for design variables subject to user-defined constraints starting from initial user guess values. For example, VisSim/OptimizePRO can automatically calculate optimal PID controller gains that give minimal time to setpoint, plus minimal overshoot. VisSim/OptimizePRO allows user-specified cost functions that can consider controller behavior, such as steady-state error, overshoot, and rise and settling times.

VisSim/OptimizePRO also works with a physical system when used with VisSim's Real-TimePRO and DSP options.

Constrained optimization of controller gains of a PID controller with VisSim/OptimizePRO. The initial guess values and final optimized values of the PID controller gains are displayed in the bottom left corner of the diagram.



PID control structure, which is accessible by right-clicking on the PID CONTROLLER compound block in the above diagram.

Highlights

- Constrained optimization
- General linear and nonlinear optimization
- Minimum or maximum of the objective function
- Multi-nonlinear constraint optimization
- Optimizes systems with no constraints
- Optimizes systems with upper and lower bounds on the design variables
- Problem setup through interactive dialog boxes
- Reporting of optimization progress and diagnostics

Technical Specifications

PROBLEM FORMULATION

Minimize the objective function $g(X)$ subject to the constraints:

$$\begin{aligned} glb_i &\leq g_i(X) \leq gub_i & \text{for } i = 1, \dots, m \\ xlb_j &\leq x_j \leq xub_j & \text{for } j = 1, \dots, n \end{aligned}$$

where X is a vector of n variables x_1, \dots, x_n , and the functions g_1, \dots, g_m may all depend on X .

METHOD OF SOLUTION

Use a generalized, reduced gradient algorithm named GRG2 to determine optimal values for the design variables subject to all the constraints.

System Requirements

- Professional VisSim™ 3.0
- 4 MB RAM
- 175 K disk space
- 3½" floppy drive

Acknowledgments

VisSim/OptimizePRO is developed by and licensed from Woodward Technologies, Inc. Woodward Technologies provides general linear and nonlinear optimization technology developed by leading experts and scientists.

Sample Applications

- Gain and parameter optimization
- Parametric system identification and modeling
- PID tuning
- Optimal HVAC duct placement
- Multiple control loop optimization
- Plant and product management
- Material handling systems
- Economics
- Missile trajectory optimization
- Automobile brake and suspension tuning
- Least cost shipment packing and scheduling

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