

	Comparison Of Differential Equation Solver Software														
Subject/Item	MATLAB	SciPy	deSolve	DifferentialEquations.jl	Sundials	Hairer	ODEPACK and Netlib	JiTCODE	PyDSTool	FATODE	GSL	BOOST	Mathematica	Maple	
Language	MATLAB	Python	R	Julia	C++ and Fortran	Fortran	Fortran	Python	Python	Fortran	C	C++	Mathematica	Maple	
Selection of Methods for ODEs	Fair	Poor	Poor	Excellent	Good (including ARKCODE)	Good	Good	Poor	Poor	Good	Poor	Fair	Good	Fair	
Efficiency*	Poor	Poor	Poor	Excellent	Good	Good	Good	Good	Good	Good	Fair	Fair	Fair	Fair	
Tweakability	Fair	Poor	Poor	Excellent	Good	Good	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair	
Event Handling	Good	None	Fair	Excellent	Good**	None	Good**	None	Fair	None	None	None	Good	Fair	
Symbolic Calculation of Jacobians and Autodifferentiation	None	None	None	Good	None	None	None	None	None	None	None	None	Excellent	Excellent	
Complex Numbers	Excellent	Fair	None	Good	Good	None	None	None	None	None	None	Good	Fair	Fair	
Arbitrary Precision Numbers	None	None	None	Excellent	None	None	None	None	None	None	None	None	Fair	Fair	
Control Over Linear/Nonlinear Solvers	None	None	None	Excellent	Excellent	Good	Depends on the solver	None	None	None	None	None	None	None	
Built-in Parallelism	None	None	None	Excellent	Excellent	None	None	None	None	None	None	Fair	None	None	
Differential-Algebraic Equation (DAE) Solvers	Good	None	None	Excellent	Excellent	Excellent	Excellent	None	Fair	Good	None	None	Good	Fair	
Constant-Lag Delay Differential Equation (DDE) Solvers	Fair	None	None	Excellent	None	Good	None	Fair	Fair	None	None	None	Good	None	
State-Dependent DDE Solvers	Poor	None	None	Excellent	None	Excellent	None	None	Fair	None	None	None	None	None	
Stochastic Differential Equation (SDE) Solvers	Poor	None	None	Excellent	None	None	None	Good	None	None	None	None	Fair	None	
Specialized Methods for 2nd Order ODEs and Hamiltonians (and Symplectic Integrators)	None	None	None	Excellent	None	Good	None	None	None	None	None	None	Good	None	
Boundary Value Problem (BVP) Solvers	Good	Fair	None	Good	None	None	Good	None	None	None	None	None	Good	None	
GPU Compatibility	None	None	None	Excellent	None	None	None	None	None	None	None	Excellent	None	None	
Analysis Addons (Sensitivity Analysis, Parameter Estimation, etc.)	None	None	None	Excellent	Good	None	None	None	None	Good	None	None	None	None	

*Efficiency takes into account not only the efficiency of the implementation, but the features of the implemented methods (advanced timestepping controls, existence of methods which are known to be more efficient, Jacobian handling)

**Event handling needs to be implemented yourself using basic rootfinding functionality

Scale

None

Poor

Fair

Good

Excellent

Explanation

Functionality does not exist

Functionality exists, but is feature-incomplete

The basic features exist

The basic features exist and some extra tweakability exists. May include extra methods for efficiency.

Has all of the basic features and more. Extra features for flexibility and efficiency.

For more detailed explanations and comparisons, see the following blog post:

<http://www.stochasticlifestyle.com/a-comparison-between-differential-equation-solver-suites-in-matlab-r-julia-python-c-and-fortran>