Answer on Question #79634 – Math – Quantitative Methods

Question

Define Local Error and Global Error.

Solution

The output of a discrete variable method is a set of points $\{t_n, X_n\}$ and the output of the dynamical system is a continuous trajectory $x(t)$. For the numerical results to provide a good approximation to the trajectory we require that the difference

$$|X_N - x(t_N)| < \varepsilon$$

where ε is some defined error tolerance, at each solution point. This difference is called the global error and is the accumulated error over all solution steps.

The local error:

$$\left|\tilde{X}_n - x(t_n)\right|$$

at each step where $\tilde{X}_n$ is the numerical solution obtained on the assumption that the numerical solution at the previous solution point is exact.