NA*lab*: A Matlab graphical environment for studying the behavior of numerical methods in undergraduate courses

Yiannis G. Saridakis[a] and Anastasis G. Sifalakis[b]

Applied Mathematics and Computers Lab (AMCL)

Department of Sciences, Technical University of Crete,

73100 Chania, Greece

[a] yiannis@science.tuc.gr, [b] sifalak@gmail.com

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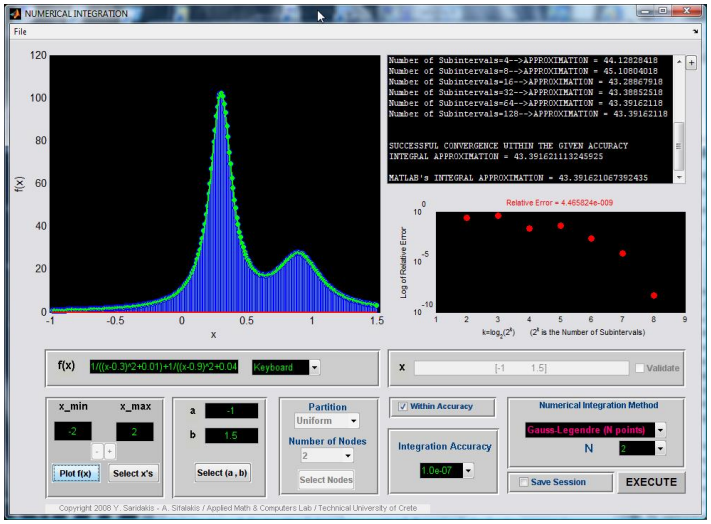
Traditionally, the study of numerical methods belongs to the core educational courses in science and engineering curricula. Understanding their underlying mechanisms, their behavior and performance were always central educational issues. Working towards this direction we developed NA*lab*, a graphical Matlab environment, to accompany the lectures of a traditional numerical analysis introductory course as the main laboratory tool. At this stage of development, NA*lab* consists of three modules pertaining to the areas of: (a) Root Finding (Bisection, Regula-Falsi, Hybrid methods, Newton-Raphson, Secant, Steffensen, Muller), (b) Interpolation - Function Approximation (Lagrange, Hermite, Linear/Hermite/Natural Splines), and (c) Numerical Integration (Riemman, Trapezoidal, Simpson, Romberg, Gauss-Legendre). The graphical user interfaces (GUI) used in NA*lab* are designed to include both input and output data at all times, while results are presented using both geometrical and numerical approaches. The successful deployment of NA*lab* in the lab sections of the Numerical Analysis courses in all engineering departments of Technical University of Crete encourages its future development.