

Convergence of starters for solving Kepler's equation via Smale's α -test

M. Calvo, A. Elipe, J.I. Montijano, L. Rández
Instituto de Matemáticas y Aplicaciones
Universidad de Zaragoza *

May 14, 2016

Abstract

In this talk, by using Smale's α -theorem on the convergence of Newton's method, the α -sets of convergence of some starters of solving the elliptic Kepler's equation are derived. For each starter we compute the exact α -set in the eccentricity-main anomaly $(e, M) \in [0, 1) \times [0, \pi]$, showing that these sets are larger than those derived by [Avendaño *et al.*(2014)]. Further, new convergence tests based on the Newton-Kantorowitch theorem are given comparing with the derived from Smale's α -test.

References

- [Avendaño *et al.*(2014)] Avendaño, M., Martín-Molina, V., Ortigas-Galindo, J.: Solving Kepler's equation via Smale's α -theory. *Celest. Mech. Dyn. Astron.* **119**, 27–44 (2014)
- [Calvo *et al.*(2013)] Calvo, M., Elipe, A., Montijano, J.I., Rández, L.: Optimal starters for solving the elliptic Kepler's equation. *Celest. Mech. Dyn. Astron.* **115**, 143–160 (2013)
- [Smale(1986)] Smale, S.: Newton's Method estimates from Data at One Point. In: *The Merging of Disciplines in Pure, Applied and Computational Mathematics*. Springer Verlag. New York-Berlin, 185–196 (1986)

*{calvo, elipe, monti, randez}@unizar.es