

# A new paradigm in the logistic and similar maps: time stepping schemes

J. Alberto Conejero<sup>b,1</sup>, Òscar Garibo-i-Orts<sup>‡</sup> and Carlos Lizama<sup>‡</sup>

(<sup>b</sup>) Instituto Universitario de Matemática Pura y Aplicada,  
Universitat Politècnica de València, Spain.

(<sup>‡</sup>) Departamento de Matemática,  
Universidad de Santiago de Chile.

## Abstract

An essential task to understand the dynamics of any discrete continuous dynamical system on an interval is to construct its bifurcation diagram. We use the Lubich's quadrature time-stepping schemes for replacing Euler scheme of order 1. In this way, we get a family of discrete models of order 1, 2, and 1/2 for the logistic and sine maps, in the line [2, 3]. In this work, we analyze its dynamics and stability properties [1].

## References

- [1] Conejero, J.A., Garibo-i-Orts, Ò. and Lizama, C., A new paradigm in the logistic and similar maps: time stepping schemes. *Preprint.*, 2023.
- [2] Wu, G.C., and Baleanu, D., Discrete fractional logistic map and its chaos. *Nonlinear Dynam.*, 75(1-2):283–287, 2014.
- [3] Wu, G.C., and Baleanu, D., S.D., Discrete chaos in fractional sine and standard maps. *Phys. Lett. A*, 378(5-6):484–487, 2014.

---

<sup>1</sup>email@correspondingauthor