

Performing Delaunay normalisations for a wide class of functions and its applications

Ernesto Lanchares¹, Jesus F. Palacin²,

SUMMARY

In this presentation we will show an ongoing effort for creating a Mathematica (cf. [1]) package that performs closed-form Delaunay normalisation on a wide variety of functions. This class of functions includes powers of the radius (both integer and real), logarithms and polylogarithms of the anomalies and products of the equation of the center, among others. Our aim is to perform the Delaunay normalisation to arbitrary high orders.

Keywords: Perturbed Keplerian Hamiltonians, normalisation of Delaunay, averaged Hamiltonian, generating function, closed form expressions

AMS Classification: 37E20, 37J40

References

- [1] Wolfram Research, Inc., MATHEMATICA, Version 14.0, Wolfram Research, Inc., Champaign, Illinois (2024).
- [2] C. Osácar and J.F. Palacián, Decomposition of functions for elliptic orbits, *Celest. Mech. Dyn. Astron.* **60**, 207–223 (1994).
- [3] J.F. Palacián, Closed-form normalization of perturbed two-body problems, *Chaos Solit. Fractals* **13**, 853–874 (2002).

¹Departamento de Estadística, Informática y Matemáticas
Universidad Pública de Navarra
email: lanchares.158315@e.unavarra.es

²Departamento de Estadística, Informática y Matemáticas
Universidad Pública de Navarra
email: palacian@unavarra.es