

This document briefly summarizes the purposes of the ANSI C programs shipped within the `orbitlie` package.

**itest.c** This program tests various analytical simplifications used during the derivation of equations (54) – (58) in [2].

**liefrac.c** This program tests the formula (23) in [2], regarding to the Lie-series of fractional functions.

**orbitlie2.c** The functions and branches in this code tests thoroughly the various recurrence relations and some of the appearing expressions of the planar problem, as it is presented in [1].

**orbitlie3.c** The functions and branches in this code tests thoroughly the various recurrence relations and some of the appearing expressions of the spatial problem, as it is presented in [2].

**lie2orbit.c** This code is an earlier version of `orbitlie2.c`.

**Makefile** A simple set of compilation and building rules used to easily create executables by involving the `make`<sup>1</sup> utility on UNIX and UNIX-like systems. The compilation and optimization flags are designed for `gcc`<sup>2</sup>, however, it can be ported for almost any C compilers.

One should keep in mind that these code snippets are intended only for testing various algorithms related to the *derivation* of the recurrence relations for the orbital elements of the planar and/or spatial  $N$ -body problem. Hence, these programs do not have any kind of user interfaces (for instance, command line arguments) and the user/reader can only perform these tests by doing modifications on the codes. However, these codes can form a basis for a more practical implementation of these algorithms.

## References

[1] Pál, A. “*Lie-series for orbital elements: I. The planar case*”, 2014, CeMDA, 119, 45

[2] Pál, A. “*Lie-series for orbital elements: II. The spatial case*”. 2015, CeMDA, submitted

---

<sup>1</sup><https://en.wikipedia.org/wiki/Makefile>

<sup>2</sup><https://gcc.gnu.org/>