

# An overview of averaging methods in Hamiltonian perturbation theory, using a CAS

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The Hamiltonian formalism is particularly well-suited for employing perturbation techniques. A widely used procedure involves transforming the system under consideration into its normal form [1], followed by the application of an averaging method to derive an approximate dynamics [2]. The computations in this latter stage can become quite cumbersome to perform manually, making it an ideal context to leverage the capabilities of a Computer Algebra System (CAS). In this talk, I will describe several examples illustrating the existence of stable closed orbits within seemingly chaotic systems, using these concepts and the free CAS Maxima [3] and [4].

**Keywords:** Normal forms, Averaging methods, Closed orbits

## References

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