

Periodic Solutions for the Generalized Anisotropic Lennard-Jones Hamiltonian

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Abstract We characterize the circular periodic solutions of the generalized Lennard-Jones Hamiltonian system with two particles in $\mathbb{R}^n$, and we analyze what of these periodic solutions can be continued to periodic solutions of the anisotropic generalized Lennard-Jones Hamiltonian system. We also characterize the periods of antiperiodic solutions of the generalized Lennard-Jones Hamiltonian system on $\mathbb{R}^{2n}$, and prove the existences of $0 < \tau^* \leq \tau^{**}$ such that this system possesses no $\tau/2$ -antiperiodic solution for all $\tau \in (0, \tau^*)$, at least one $\tau/2$ -antiperiodic solution when $\tau = \tau^*$, precisely 2^n families of $\tau/2$ -antiperiodic circular solutions when $\tau = \tau^{**}$, and precisely 2^{n+1} families of $\tau/2$ -antiperiodic circular solutions when $\tau > \tau^{**}$. Each of these circular solution families is of dimension $n - 1$ module the S^1 -action.

Keywords Lennard-Jones potential · Circular periodic solutions · Anisotropic Lennard-Jones potential

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