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**Geodesic flows on the two-dimensional torus and phase transitions “commensurability-noncommensurability”.** (English. Russian original) [Zbl 0641.58032](#)  
*Funct. Anal. Appl.* 20, 260-266 (1986); translation from *Funkts. Anal. Prilozh.* 20, No. 4, 9-16 (1986).

The authors consider invariant sets of geodesic flows on the torus  $T^2$ . For each rational member of rotation, they construct such an invariant set being torus or Cantor torus. The main result is that an invariant Lagrangian torus of geodesic flows has projection on the base of cotangent bundle if and only if its geodesic trajectories are A-geodesic (minimizing length). Aubry’s method is adapted for the geodesic flows on  $T^2$ .

Reviewer: P.Khmelevskaya

**MSC:**

- 37D40 Dynamical systems of geometric origin and hyperbolicity (geodesic and horocycle flows, etc.)
- 53D25 Geodesic flows in symplectic geometry and contact geometry
- 82C26 Dynamic and nonequilibrium phase transitions (general) in statistical mechanics

Cited in **2** Reviews  
Cited in **13** Documents

**Keywords:**

phase transitions; commensurability-incommensurability; geodesic flows

**Full Text:** [DOI](#)

**References:**

- [1] S. Aubry, "The twist map, the extended Frenkel-Kontorova model and the devil's staircase," *Physica*,7D, 240-258 (1983). · [Zbl 0559.58013](#)
- [2] S. Aubry and P. Y. Le Daeron, "The discrete Frenkel-Kontorova model and its extensions," *Physica*,8D, 381-422 (1983). · [Zbl 1237.37059](#)
- [3] M. Herman, "Sur les courbes invariantes par les diffeomorphismes de l'anneau," *Asterisque*,103-104, 3-38 (1983).
- [4] H. M. Morse, "A fundamental class of geodesics on any closed surface of genus greater than one," *Trans. Am. Math. Soc.*,26, No. 1, 25-60 (1924). · [Zbl 50.0466.04](#) · [doi:10.1090/S0002-9947-1924-1501263-9](#)
- [5] G. Hedlund, "Geodesics on a two-dimensional Riemannian manifold with periodic coefficients," *Ann. Math. Ser.* 2,33, No. 4, 719-739 (1932). · [Zbl 58.1256.01](#) · [doi:10.2307/1968215](#)
- [6] V. I. Arnol'd, *Mathematical Methods of Classical Mechanics* [in Russian], Nauka, Moscow (1979).
- [7] V. V. Kozlov, "Calculus of variations and classical mathematics," *Usp. Mat. Nauk*,40, No. 2, 33-60 (1985). · [Zbl 0557.70025](#)
- [8] V. M. Alekseev, V. M. Tikhomirov, and S. V. Fomin, *Optimal Control* [in Russian], Nauka, Moscow (1979). · [Zbl 0516.49002](#)
- [9] A. A. Andronov, E. A. Leontovich, I. I. Gordon, and A. G. Maier, *Qualitative Theory of Second-Order Dynamical Systems* [in Russian], Nauka, Moscow (1966). · [Zbl 0168.06801](#)
- [10] V. I. Arnol'd, *Supplementary Chapters of the Theory of Ordinary Differential Equations* [in Russian], Nauka, Moscow (1978).

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