SYMPLECTIC MAPS

symplectic

n-

q, p,

$$\omega = p \wedge q. \qquad (1)$$

(q_i, p_i), $i = 1, \ldots, n$,

$\omega(v, w)$

$F(q, p$

$') = qp' + tH(q, p')$

$F = q' p' + p q$,

$$q' = q + t\frac{\partial H}{\partial p'}(q, p'), \quad p' = p - t\frac{\partial H}{\partial q}(q, p'). \qquad (4)$$

S S

H

p'. , $H = K(p) + V(q)$

,

S

(., 1).

, ,

, ,

The Symplectic Group

$\{\ldots z_t, z_{t+1}, \ldots\}$

$z_{t+1} = f(z_t)$ J

f , $M = \prod_t Df(z_t)$.

f , M (2), $M^t J M = J$.

$2n \times 2n$

$Sp(2n)$. $n(2n+1)$-

JS S

t-

, ,

, $-I$. ,

( ).

(& S , 1)

M λ

M k, λ^{-1}.

$(M) = 1$, M

(λ, λ^{-1})

- *hyperbolic*, λ
- *hyperbolic with reflection*, λ
- *elliptic*, $\lambda = {}^{2\pi\omega}$
- *Krein quartet* λ

$(\lambda, \lambda^{-1}, \bar{\lambda}, \bar{\lambda}^{-1})$.

,

$m \cdot (0) \neq n$ m n.

C D (0), (n-

(1)).

1

n-

(, 1)

beyond all orders.

$n = 1$.

$\mathbb{S} \times \mathbb{R}$ (

) $\partial q'/\partial p \geq c > 0$. ,

ω. ω

Lipschitz graph, $p = P(q)$,

ω.

(*cantorus*

).

(

2001). , (1 1)

(

& , 1 2).

(a, b, c) (., 1).

J S SS

See also **Aubry–Mather theory; Cat map; Chaotic dynamics; Constants of motion and conservation laws; Ergodic theory; Fermi acceleration and Fermi map; Hamiltonian systems; Hénon map; Horseshoes and hyperbolicity in dynamical systems; Lyapunov exponents; Maps; Measures; Melnikov method; Phase space; Standard map**

Further Reading

, . . 1 . . *Mathematical Methods of Classical Mechanics*,

, . 1 . *Beam Dynamics: A New Attitude and Framework (The Physics and Technology of Particle and Photon Beams)*,

, . 2001. *Symplectic Twist Maps: Global Variational Techniques*,

, . 1

Manuscript Queries

Title: Encyclopedia of Non-linear Sciences
Alphabet S: Symplectic maps

Page	Query Number	Query
No Query		