M. A. H [illegible],[1,*] M. S [illegible],[1,†] [illegible] T. J. S [illegible][2,‡]

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(R [illegible] 21 J [illegible] 2012; [illegible] 26 J [illegible] 2012)

T [illegible] . I [illegible] . H [illegible] . S [illegible] 70 [illegible] 6281.8 [illegible] 2

N [illegible][1] O [illegible][2] [illegible] S [illegible][3] [illegible] *confined* [illegible] *extended* [illegible][4] M [illegible][5] [illegible][6] [illegible][7,9] [illegible][8] T [illegible][10] [illegible][5,11]

W [illegible][12] T [illegible][13] N [illegible][14] P [illegible] TJ-0-1.154, [illegible]

T [illegible] . T [illegible] . W [illegible]

T [illegible] L [illegible] -L [illegible][5]

$$[illegible]_{eff} - \alpha\, \hat{m} \times (\hat{m} \times \vec{h}_{eff})$$

$$\vec{h}_{eff} = [illegible]^2 \hat{m} + (h_0 + m_z) z, \quad (1)$$

[illegible] ($\alpha >$ 0 [illegible]) [illegible]. T [illegible] $[illegible]^2 \hat{m}$, [illegible]

$h_0(\vec{x},t)z$ … $m_z z$. C … H … $H > M$. T … $|\gamma|\mu_0 M (Q-1)$, … $L / \sqrt{Q-1}$, … $M(Q-1)$, … $Q = H/M > 1$. W … $L/\sqrt{Q-1}$ (D … R 17). F C /N [19] … 27 … 17 … $\alpha \approx 0.01$, $Q \approx 1.25$, … $M \approx 650$ A/ . R … [12] … . T …

W $h_0 = \alpha = 0$, E . (1) …

$$\mathcal{N} = \int (1 - \quad) d\vec{x}, \quad \vec{\mathcal{P}} = \int (\quad - 1) \quad d\vec{x},$$

$$\mathcal{E}_0 = \frac{1}{2}\int \left[|\quad|^2 + \quad^2 (1 + |\quad|^2) \right] d\vec{x},$$

… . M … $\mathcal{N}$ … $\vec{\mathcal{P}}$ … $\vec{V}$ … ω.[17] T … $(\mathcal{N}, \vec{\mathcal{P}})$ … $(\omega, \vec{V})$. D … [13]

$$\omega + |\vec{V}|^2/4 < 1, \quad \vec{V} \neq 0, \quad 0 < \omega < 1, \quad \vec{V} = 0. \qquad (2)$$

W … $\omega < 0$.[17] T … 1, … . S … 0 … [20] H … . W … , T [21] … 5 … 63 μ . T …

A … ($\alpha \ll 1$) … ($|\nabla h_0|, |\partial_t h_0| \ll 1$), … h_0, … . T … $(\omega, \vec{V})$, … V-ω … .

A

U … (, ., R 22), … :

$$\frac{d\mathcal{N}}{dt} = -\alpha(\omega + h_0)\int \quad^2 \, d\vec{x} - \alpha\vec{V}\cdot\int \quad^2$$

300 ... E . (3)

$m_z = 0.5$. F

$\alpha = 0.01$, 3 μ

30 15- A 3.3-μ

. T 600 / .

$\alpha = 0.001$, 10 μ

70 10- A 10.3-μ .

$|\nabla h_0|/\alpha \ll 1$

T , $|\nabla h_0|/\alpha \ll 1$, -

. W

. F . 3, (3)

acceleration

0 . W

,

.

T

1D .[23]

W

(5). F E . (5) $\hat{P} = \hat{m}_{\text{eff}} V + m_{\text{eff}} \hat{V}$,

.

, E . (3) $\hat{P} < 0$

. T ($\hat{V} > 0$)

$$\hat{m}_{\text{eff}} < \hat{P}/V < 0. \quad (6)$$

,

.

A F . 3( ) 3( ) ,

(6) $\omega > 0.3$. W $-1 < h_0 <$

0, .

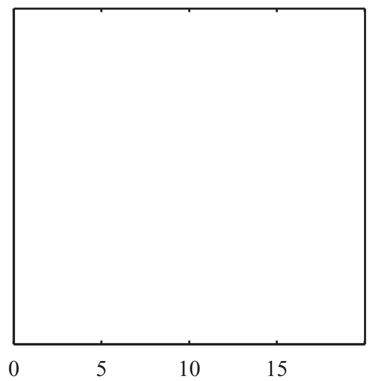
,

$(V,\omega) = (0,0)$

F . 3( ) *switching*

separatrix. T

$(V,\omega) = (0, -h_0)$. L


0
5
10
15