

$$\dot{u} = u'' + \gamma u - u^3,$$

$$u'(0, t) = 0, \quad u'(1, t) = \alpha u(x_0, t),$$

$$u = u(x, t), \quad t \geq 0, \quad x \in [0, 1], \quad \alpha, \gamma \in \mathbb{R}, \quad x_0 \in [0, 1).$$

$$\dot{u} = u'' + \gamma u,$$

$$u'(0, t) = 0, \quad u'(1, t) = \alpha u(x_0, t).$$

$$u(x, t) = e^{\lambda t} v(x).$$

$$v'' + (\gamma - \lambda)v = 0,$$

$$v'(0) = 0, \quad v'(1) = \alpha v(x_0).$$

$$\mu = \sqrt{-\gamma + \lambda}, \quad v(x) = c \operatorname{ch} \mu x, \quad c \in \mathbb{R}.$$

$$\mu \operatorname{sh} \mu = \alpha \operatorname{ch} \mu x_0,$$

$$\lambda = 0 : \quad \mu = \sqrt{-\gamma},$$

$$\alpha_u = \frac{\sqrt{-\gamma} \operatorname{sh} \sqrt{-\gamma}}{\operatorname{ch} \sqrt{-\gamma} x_0}.$$

$$\lambda = i\omega : \quad \mu = \sqrt{-\gamma + i\omega},$$

$$\alpha_c = \frac{\sqrt{-\gamma + i\omega} \operatorname{sh} \sqrt{-\gamma + i\omega}}{\operatorname{ch} \sqrt{-\gamma + i\omega} x_0}.$$

$$\gamma = 0, \quad x_0 = 0 :$$

$$\begin{cases} \operatorname{tg} y + \operatorname{th} y = 0, \\ \alpha_c = y(\operatorname{sh} y \cos y - \operatorname{ch} y \sin y), \end{cases}$$

$$y = \sqrt{\frac{\omega}{2}}.$$

$$\gamma = 0, \quad x_0 \neq 0 :$$

$$\begin{cases} \frac{\operatorname{sh} y \cos y + \operatorname{ch} y \sin y}{\operatorname{sh} y \cos y - \operatorname{ch} y \sin y} - \operatorname{tg} y x_0 \operatorname{th} y x_0 = 0, \\ \alpha_c = \frac{y \operatorname{sh} y \cos y - y \operatorname{ch} y \sin y}{\operatorname{ch} y x_0 \cos y x_0}. \end{cases}$$

$$\gamma \neq 0, \quad x_0 \neq 0.$$

$$\dot{u}_j = n^2(u_{j+1} - 2u_j + u_{j-1}) + \gamma u_j, \quad j = \overline{1, n}.$$

$$u_0 = u_1, \quad u_{n+1} = u_n + \frac{\alpha_c}{n} u_1.$$

$$u = \sqrt{\varepsilon} u_0 + \varepsilon u_1 + \varepsilon^{\frac{3}{2}} u_2 + O(\varepsilon^2),$$

$$\varepsilon = |\alpha - \alpha_{cr}|, \quad \varepsilon \ll 1, \quad s = \varepsilon t.$$

$$\lambda = 0 : \mu = \sqrt{-\gamma}, \quad \alpha_{cr} = \alpha_u, \quad \varepsilon = \alpha - \alpha_d.$$

$$u_0 = u_0'' + \gamma u_0,$$

$$u_0'(0, t) = 0, \quad u_0'(1, t) = \alpha_u u_0(x_0, t),$$

$$u_0 = \rho(s) \operatorname{ch} \sqrt{-\gamma} x.$$

$$\dot{u}_2 + \frac{\partial u_0}{\partial s} = u_2'' + \gamma u_2 - u_0^3,$$

$$u_2'(0, t) = 0, \quad u_2'(1, t) = \alpha_u u_2(x_0, t) + u_0(x_0, t).$$

$$u_2 = e^{\lambda t} v_2(x), \quad \lambda = 0.$$

$$v_2'' + \gamma v_2 - \rho^3 \operatorname{ch}^3 \sqrt{-\gamma} x - \rho' \operatorname{ch} \sqrt{-\gamma} x = 0,$$

$$v_2'(0) = 0, \quad v_2'(1) = \alpha_u v_2(x_0) + \rho(s) \operatorname{ch} \sqrt{-\gamma} x_0.$$

$$v_2(x) = c \operatorname{ch} \sqrt{-\gamma} x - \frac{\rho^3}{32} \operatorname{ch} 3\sqrt{-\gamma} x + \frac{3\rho^3 + 4\rho'}{8\sqrt{-\gamma}} x \operatorname{sh} \sqrt{-\gamma} x.$$

$$\rho' = \phi \rho + d\rho^3,$$

$$\phi = \frac{2\mu \operatorname{ch} \mu x_0}{\mu \operatorname{ch} \mu + \operatorname{sh} \mu - \alpha_d x_0 \operatorname{sh} \mu x_0},$$

$$d = \frac{-3\gamma \operatorname{sh} 3\mu - 12\operatorname{sh} \mu - 12\mu \operatorname{ch} \mu - \alpha_d \mu \operatorname{ch} 3\mu x_0 + 12\alpha_d x_0 \operatorname{sh} \mu x_0}{16(\operatorname{sh} \mu + \mu \operatorname{ch} \mu - \alpha_d x_0 \operatorname{sh} \mu x_0)}.$$

$$u = \pm \sqrt{\varepsilon} A_u \operatorname{ch} \sqrt{-\gamma} x + O(\varepsilon),$$

$$A_u = \sqrt{\left| \frac{\phi_0}{d_0} \right|}.$$

$$\lambda = i\omega : \mu = \sqrt{-\gamma + i\omega}, \quad \alpha_{cr} = \alpha_c, \quad \varepsilon = \alpha_c - \alpha.$$

$$u_0 = u_0'' + \gamma u_0,$$

$$u_0'(0, t) = 0, \quad u_0'(1, t) = \alpha_c u_0(x_0, t).$$

$$u_0 = z(s)e^{i\omega t} \operatorname{ch} \mu x + \overline{z(s)}e^{-i\omega t} \overline{\operatorname{ch} \mu x}.$$

$$\dot{u}_2 + \frac{\partial u_0}{\partial s} = u_2'' + \gamma u_2 - u_0^3,$$

$$u_2'(0, t) = 0, \quad u_2'(1, t) = \alpha_c u_2(x_0, t) + u_0(x_0, t).$$

$$u_2 = e^{i\omega t} v_2(x).$$

$$v_2'' + (\gamma - i\omega)v_2 - z'w(x) - 3z|z|^2w|w|^2 = 0,$$

$$v_2'(0) = 0, \quad v_2'(1) = \alpha_u v_2(x_0) + z(s)w(x_0),$$

$$w(x) = \operatorname{ch} \sqrt{-\gamma + i\omega} x.$$

$$z' = \phi z + dz|z|^2.$$

$$\phi_0 = -\operatorname{Re} \left(\frac{2\mu \operatorname{ch} \mu x_0}{\mu \operatorname{ch} \mu + \operatorname{sh} \mu - \alpha_c x_0 \operatorname{sh} \mu x_0} \right),$$

$$d_0 = \operatorname{Re} \left(\frac{3\mu(G(\mu + 2\operatorname{Re}\mu) + G(\mu + 2i\operatorname{Im}\mu) + 2G(\bar{\mu}))}{2(\mu \operatorname{ch} \mu + \operatorname{sh} \mu - \alpha_c x_0 \operatorname{sh} \mu x_0)} \right),$$

$$G(y) = \frac{\alpha_c - y \operatorname{sh} y}{y^2 + \gamma - i\omega}.$$

$$u = \pm \sqrt{\varepsilon} A_c \operatorname{ch} \sqrt{-\gamma + i\omega} x + O(\varepsilon),$$

$$A_c = \sqrt{-\frac{\phi_0}{d_0}}.$$

$$\dot{u} = u'' + \gamma u,$$

$$u'(0, t) = 0, \quad u'(1, t) = \alpha u(x_0, t) + \beta u^3(x_0, t),$$

$$u = u(x, t), \quad t \geq 0, \quad x \in [0, 1], \quad \alpha, \gamma \in \mathbb{R}, \quad \beta \in \mathbb{R} \setminus \{0\}, \quad x_0 \in [0, 1].$$

$$\lambda = 0 : \mu = \sqrt{-\gamma}, \quad \alpha_{cr} = \alpha_u, \quad \varepsilon = \alpha - \alpha_d.$$

$$\dot{u}_2 + \frac{\partial u_0}{\partial s} = u_2'' + \gamma u_2,$$

$$u_2'(0, t) = 0, \quad u_2'(1, t) = \alpha_u u_2(x_0, t) + u_0(x_0, t) + \beta u_0^3(x_0, t).$$

$$u_2 = e^{\lambda t} v_2(x), \quad \lambda = 0.$$

$$v_2'' + \gamma v_2 - \rho' \operatorname{ch} \sqrt{-\gamma} x = 0,$$

$$v_2'(0) = 0, \quad v_2'(1) = \alpha_u v_2(x_0) + \rho \operatorname{ch} \sqrt{-\gamma} x_0 + \beta \rho^3 \operatorname{ch}^3 \sqrt{-\gamma} x_0.$$

$$v_2(x) = c \operatorname{ch} \sqrt{-\gamma} x + \frac{\rho'}{2\sqrt{-\gamma}} \operatorname{sh} \sqrt{-\gamma} x + \frac{\rho' x}{2} \operatorname{ch} \sqrt{-\gamma} x.$$

$$\phi_0 = Q \operatorname{ch} \sqrt{-\gamma} x_0, \quad d_0 = \beta Q \operatorname{ch}^3 \sqrt{-\gamma} x_0,$$

$$Q = \frac{2\sqrt{-\gamma}}{\sqrt{-\gamma} \operatorname{ch} \sqrt{-\gamma} + \operatorname{sh} \sqrt{-\gamma} - \alpha_u x_0 \sqrt{-\gamma} x_0}.$$

$$\lambda = i\omega : \mu = \sqrt{-\gamma + i\omega}, \quad \alpha_{cr} = \alpha_c, \quad \varepsilon = \alpha_c - \alpha.$$

$$\dot{u}_2 + \frac{\partial u_0}{\partial s} = u_2'' + \gamma u_2,$$

$$u_2'(0, t) = 0, \quad u_2'(1, t) = \alpha_c u_2(x_0, t) - u_0(x_0, t) + \beta u_0^3(x_0, t).$$

$$u_2 = e^{i\omega t} v_2(x).$$

$$v_2'' + (\gamma - i\omega) v_2 - z' w(x) = 0,$$

$$v_2'(0) = 0, \quad v_2'(1) = \alpha_u v_2(x_0) - z w(x_0) + 3\beta z |z|^2 w |w|^2.$$

$$\phi_0 = -2 \operatorname{Re}(Q \operatorname{ch} \mu x_0),$$

$$d_0 = 1.5\beta \operatorname{Re}(Q(\operatorname{ch}(\mu + 2 \operatorname{Re} \mu) x_0 + \operatorname{ch}(\mu + 2i \operatorname{Im} \mu) x_0 + 2 \operatorname{ch} \bar{\mu} x_0)).$$

$$Q = \frac{\mu}{\mu \operatorname{ch} \mu + \operatorname{sh} \mu - \alpha_c x_0 \operatorname{sh} \mu x_0}.$$

$$\dot{u} = u'' + \gamma u - u^3,$$

$$u'(0, t) = 0, \quad u'(1, t) = \alpha \int_0^1 u(y, t) dy,$$

$$u = u(x, t), \quad t \geq 0, \quad x \in [0, 1], \quad \alpha, \gamma \in \mathbb{R}.$$

$$\dot{u} = u'' + \gamma u,$$

$$u'(0, t) = 0, \quad u'(1, t) = \alpha \int_0^1 u(y, t) dy.$$

$$u(x, t) = e^{\lambda t} v(x).$$

$$v'' + (\gamma - \lambda)v = 0,$$

$$v'(0) = 0, \quad v'(1) = \alpha \int_0^1 v(y) dy.$$

$$\mu = \sqrt{-\gamma + \lambda}, \quad v(x) = c \operatorname{ch} \mu x, \quad c \in \mathbb{R}.$$

$$\alpha = \mu^2 = -\gamma + \lambda.$$

$$\lambda = 0: \quad \mu = \sqrt{-\gamma},$$

$$\alpha_u = -\gamma.$$

$$\dot{u}_j = n^2(u_{j+1} - 2u_j + u_{j-1}) + \gamma u_j, \quad j = \overline{1, n}.$$

$$u_0 = u_1, \quad u_{n+1} = u_n + \frac{\alpha}{n^2} \sum_{k=1}^n u_k.$$

$$\varepsilon = \alpha - \alpha_u.$$

$$\dot{u}_0 = u_0'' + \gamma u_0,$$

$$u_0'(0, t) = 0, \quad u_0'(1, t) = \alpha_u \int_0^1 u_0(y, s) dy,$$

$$u_0 = \rho(s) \operatorname{ch} \sqrt{-\gamma} x.$$

$$\dot{u}_2 + \frac{\partial u_0}{\partial s} = u_2'' + \gamma u_2 - u_0^3,$$

$$u_2'(0, t) = 0, \quad u_2'(1, t) = \alpha_u \int_0^1 u_2(y, t) dy + \int_0^1 u_0(y, s) dy.$$

$$u_2 = e^{\lambda t} v_2(x), \quad \lambda = 0.$$

$$v_2'' + \gamma v_2 - \rho' \operatorname{ch} \sqrt{-\gamma} x - \frac{3\rho^3 \operatorname{ch} \sqrt{-\gamma} x}{4} - \frac{\rho^3 \operatorname{ch} 3\sqrt{-\gamma} x}{4} = 0,$$

$$v_2'(0) = 0, \quad v_2'(1) = \alpha_u \int_0^1 v_2(y) dy + \frac{\rho \operatorname{sh} \sqrt{-\gamma}}{\sqrt{-\gamma}}.$$

$$v_2(x) = c \operatorname{ch} \sqrt{-\gamma} x + -\frac{\rho^3}{32} \operatorname{ch} 3\sqrt{-\gamma} x + \frac{3\rho^3 + 4\rho'}{8\sqrt{-\gamma}} x \operatorname{sh} \sqrt{-\gamma} x.$$

$$\rho' = \rho + d_0 \rho^3,$$

$$d_0 = -\frac{5\gamma \operatorname{sh} 3\sqrt{-\gamma}}{48 \operatorname{sh} \sqrt{-\gamma}} - \frac{3}{4}.$$