Piston Dispersive Shock Wave Problem

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two

$$i\varepsilon \quad_t = -\frac{\varepsilon^2}{2} \quad + V_0(\ , t) \quad + | \quad |^2 \quad , \qquad 0 < \varepsilon \ll 1. \qquad (\ )$$

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, $\varepsilon = 0.015$, E

$V_0(\ , t) = V_{\max} H(\ _p t - \ )$ $H(\ )$,

$V_{\max}$ $_p$ $(\ , 0) \to \sqrt{\rho_R}$ $\to \infty$ $(\ , 0) \to 0$ $\to -\infty$, $V_{\max} \gg \rho_R$

$V_{\max} H(- \ )$ $t \leq 0$, $\rho_R = 0.133$

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$$= \sqrt{\rho}\,\exp[\tfrac{i}{\varepsilon}\int_0 \ (\ ', t)d \ ']$$

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$$\rho_t + (\rho \ ) \ = 0,$$

$$(\rho \ )_t + \left(\rho \ ^2 + \frac{1}{2}\rho^2\right) \ = \frac{\varepsilon^2}{4}[\rho(\log\rho) \ ] \ - \rho V_0 \ , \quad ( )$$

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$$\cdot_s^- = \frac{1}{2}\cdot_p + \sqrt{\rho_R}, \qquad \cdot_s^+ = \frac{2\cdot_p^2 + 4\cdot_p\sqrt{\rho_R} + \rho_R}{\cdot_p + \sqrt{\rho_R}}.$$

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$$\rho_{\min} = \left(\sqrt{\rho_R} - \frac{1}{2}\cdot_p\right)^2, \qquad {}_{\min} = -\cdot_p\left(\frac{\sqrt{\rho_R} + \frac{1}{2}\cdot_p}{\sqrt{\rho_R} - \frac{1}{2}\cdot_p}\right).$$

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$$\rho_{\max} = \rho_L = (\cdot_p/2 + \sqrt{\rho_R})^2 \qquad {}_{\max} = {}_L = \cdot_p$$

E ( ) $= V =$ p (

$l = 2\varepsilon K(4\rho_R/\ _p^2)/\ _p$

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σ) $_s^- =$ $_p + (\ _p + 3\sqrt{\rho_R})[\frac{_p E(4\rho_R/\ _p^2)}{(\ _p - 2\sqrt{\rho_R})K(4\rho_R/\ _p^2)} - 1]^{-1}$

$_s^+$ E ( )

$N_{\mathrm{vac}}(t) \approx \lceil \frac{_s^- - \ _p}{l} t \rceil = \lceil \frac{(\ _s^- - \ _p)\ _p}{2\varepsilon K(4\rho_R/\ _p^2)} t \rceil$

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$_s^-$ E ( )

$(\ _p = \sqrt{\rho_R})$ $(\ _p = 2.5\sqrt{\rho_R})$

E ( )

$= \ _p$