

computations

immediate

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Try $(i = \mu + u^2 + u^4, \dot{\mu} = \varepsilon(1 + u))$, rescale get

$$\begin{aligned}\partial_\sigma v &= av + \varphi\rho + \varphi[v^2 + \varepsilon^{2/3}(u_R + v)^4] \\ \partial_\sigma \rho &= \varphi\varepsilon^{1/3}(u_R + v)\end{aligned}\tag{0.1}$$

for $\sigma \geq 0$, look at $\varphi\varepsilon^{2/3}u_R^4$ term, which grows like $\sim \varepsilon^{2/3}e^{3\sigma}$. Suggest weight like $w = \varepsilon^{-2/3}e^{-3\sigma}$, and nonlinear term

$$|\varphi v^2|_w = \sup w\varphi v^2 \sim \varepsilon^{-2/3}e^{-3\sigma}e^{-\sigma}(\varepsilon^{2/3}e^{3\sigma})^2 \sim \varepsilon^{2/3}e^{2\sigma} = \mathcal{O}(1)$$

for $\sigma \leq -\log(\varepsilon)/3$. but we still getting $e^{2\sigma}....$