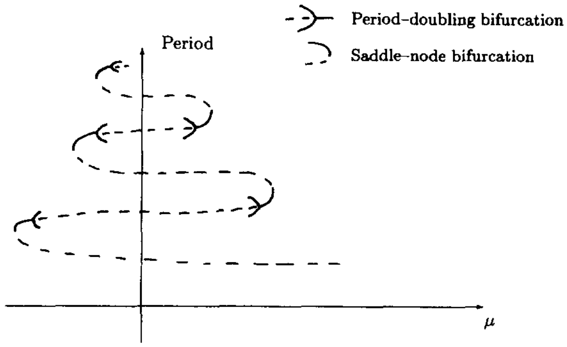


[redacted]

[redacted]

[redacted]

... the problem of finding periodic orbits in the flow by the

problem of finding solutions of the equation

$$z - \mu \approx \beta z^{\delta} \cos\left[\frac{\omega_1}{\nu}(\log h - \log z) + \phi_2\right], \quad (2)$$

where β (> 0), h and ϕ_2 are constants relating to the exact geometry of the flow and $\delta = |\lambda/\nu|$ (see for example [13] for a derivation of this result).

Each root of this equation approximately corresponds to a periodic orbit in the flow, the approximation getting better as the homoclinic orbit is approached.

In the following, we assume that δ and ν are fixed, impose the condition that there is a saddle-node bifurcation

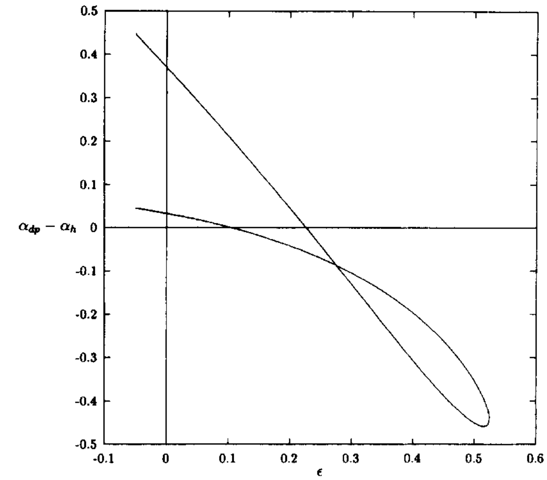
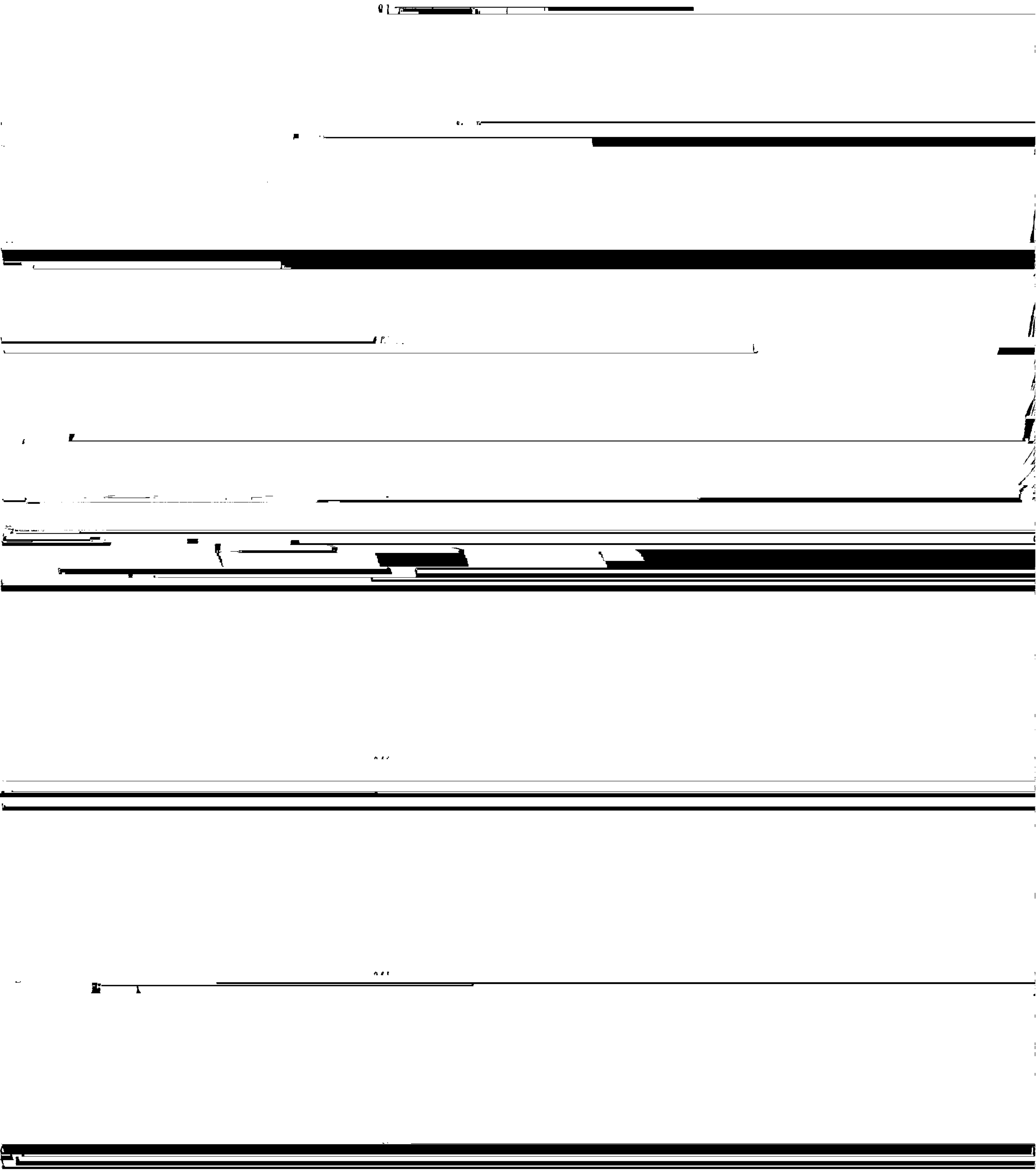
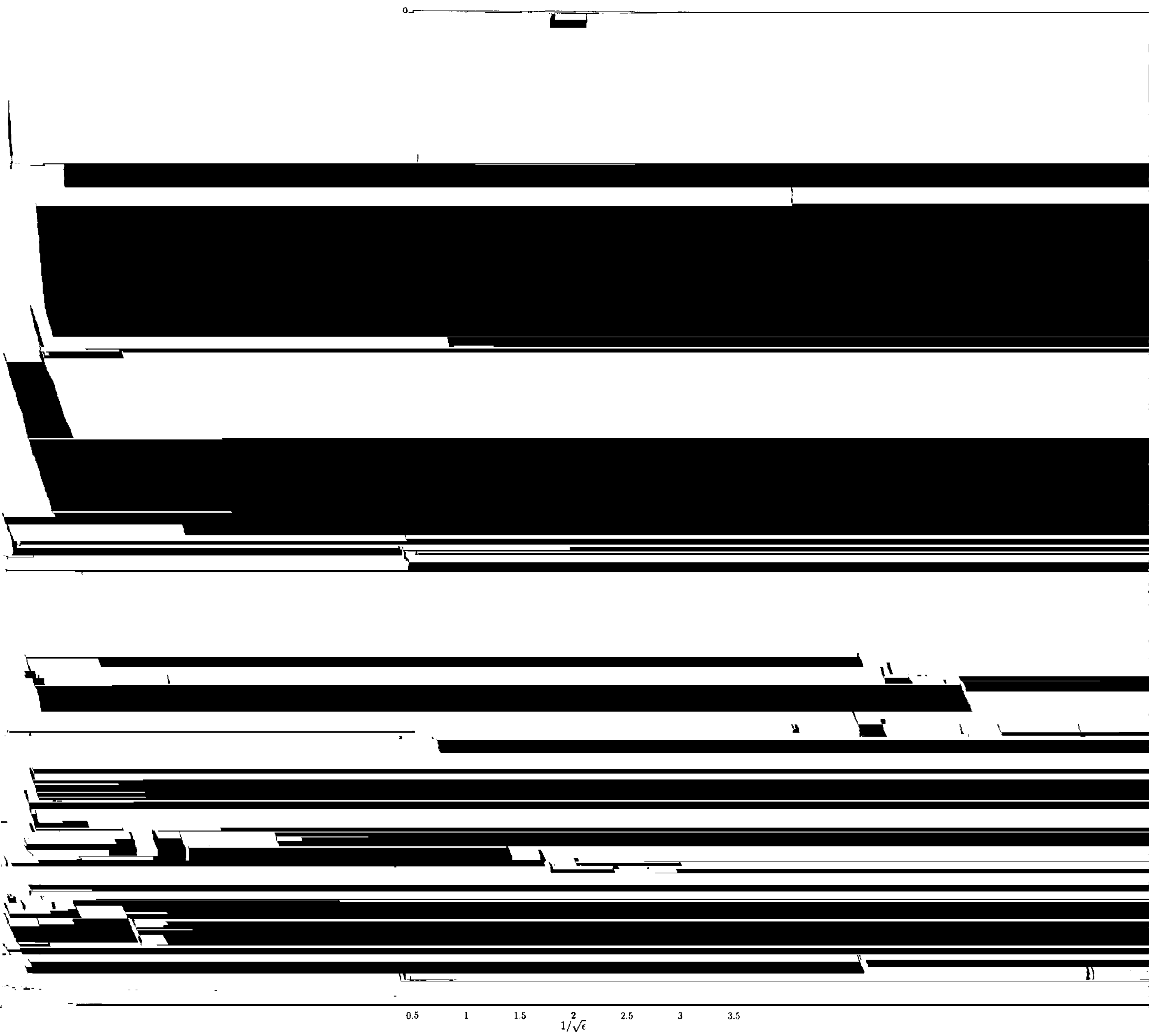


Fig. 3. The relative positions of two curves of double-pulse homoclinic bifurcations and the curve of primary homoclinic bifurcations for Eq. (16). The horizontal axis is ϵ and the vertical one is the difference between the α-values for the two curves (α_{dp}) and α_{h}. Two crossings are clearly seen as ϵ increases. Note that in this case the two curves of double-pulse homoclinics join together as ϵ increases.




0
0.5
1
1.5
2
2.5
3
3.5
$1/\sqrt{\epsilon}$

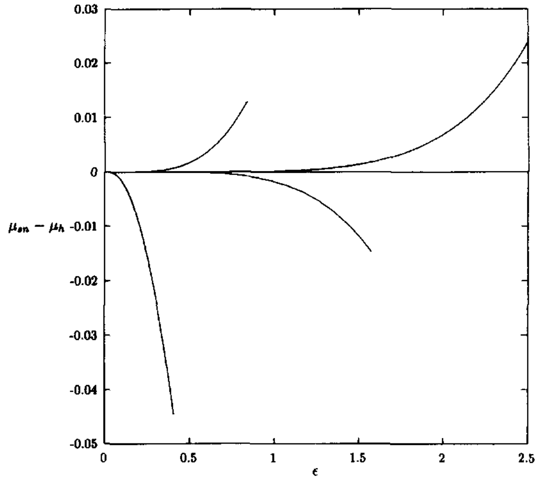
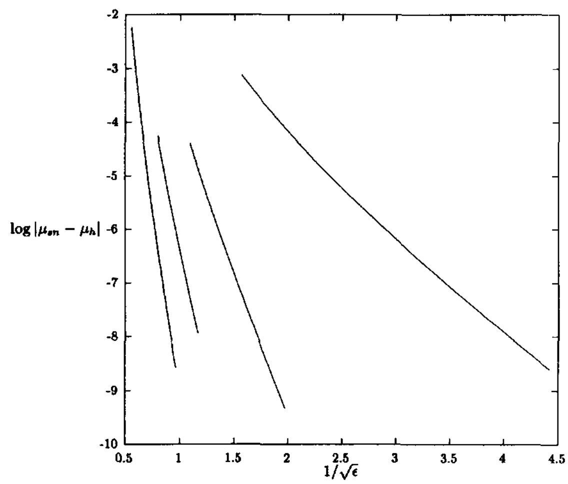


Fig. 7. A plot of the difference in μ-values for four curves of saddle-node bifurcations of periodic orbits and the curve of homoclinic [redacted]



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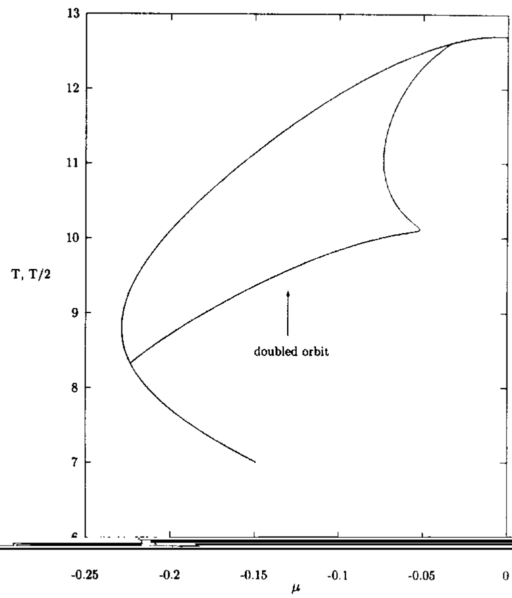

Fig. 9. A plot of period T (of the basic orbit) and half-period $\frac{1}{2}T$ (of the period-doubled orbit) versus α for Eq. (16), showing the bifurcation sequence "period-doubling, saddle-node, reverse period-doubling". The value of ϵ is 0.22346, and γ is 0.5.

5. Conclusion and comments

We did not dicuss path 1 of Fig. 2 in this paper. The bifurcations that occur along here are expected to be of interest because when $\delta = 1$, the sum of the eigenvalues of the Jacobian is zero and the flow is then locally "conservative" in some sense. There are expected to be some similarities with the $|\lambda/\nu| = 0.5$ case for the saddle-focus, as the flow in this case is also "divergence-free" at the stationary point. This last case is mentioned in [6], but does not seem to [illegible]

One other avenue open for investigation is the application of the technique discussed in Section 3 to systems [illegible]