

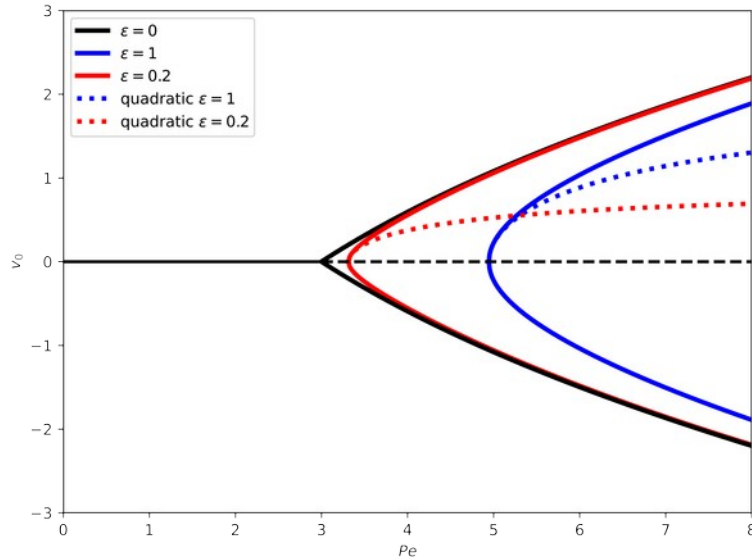
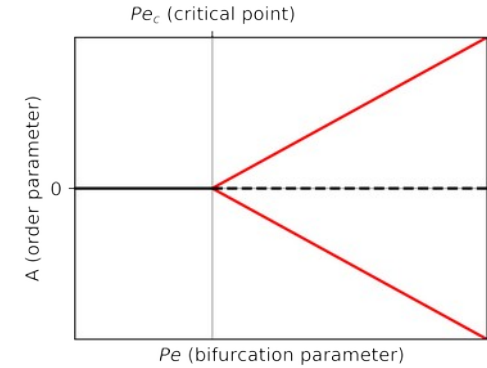
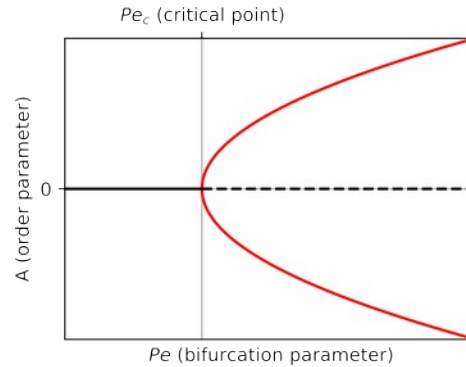
Regularization theory of singular bifurcations

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- Exact solutions are usually unavailable for non-linear problems
- Perturbative solutions are used instead
- They rely on analytic expansions
- Some problems are singular and analytic expansions are not possible



Singular model and its regularizations

- Regularization can be used to remove the singularity and obtain the perturbative solution.
- However, the perturbative series of the regularized problem converges only in a small region, which goes to zero as the problem approaches the singular limit
- Contradiction: Regularization parameter needs to be as small as possible to reproduce the singular solution but it also needs to be large to have a large region of convergence of the perturbative series
- As a result, the perturbative expansion of the regularized problem has nothing in common with the singular solution

Is there any hope?