

The Central Controlled Dynamics

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The center manifold theorem is a model reduction technique for determining the local asymptotic stability of an equilibrium of a dynamical system when its linear part is not hyperbolic. The overall system is asymptotically stable iff the center manifold dynamics is asymptotically stable. This allows for a substantial reduction in the dimension of the system whose asymptotic stability must be checked. Moreover the center manifold and its dynamics need not be computed exactly, frequently a low degree approximation is sufficient to determine its stability. The central controlled dynamics plays a similar role in determining the local stabilizability of an equilibrium of a control system when its linear part is not stabilizable. It is a reduced order system with parameters that can be tuned in attempt to stabilize it. If this is successful then the overall control system is locally stabilizable to the equilibrium. Again usually a low degree approximation suffices.