

The implication of the characteristic-values of the linearized system on the original nonlinear system:

$\lambda_1 < \lambda_2 < 0$	improper node	asymptotically stable
$\lambda_1 > \lambda_2 > 0$	improper node	unstable
$\lambda_1 < 0 < \lambda_2$	saddle point	unstable
$\lambda_1 = \lambda_2 < 0$	node*	asymptotically stable
$\lambda_1 = \lambda_2 > 0$	node*	unstable
$\lambda_{1,2} = \alpha \pm i\beta$ with α, β real		
$\alpha = 0$	center	stable, not asymp stab
$\alpha < 0$	spiral point	asymptotically stable
$\alpha > 0$	spiral point	unstable

*** Footnote: When $\lambda_1 = \lambda_2$, the critical point must be a node. However it can be a proper node if, and only if, $A = \lambda_1 I$.**