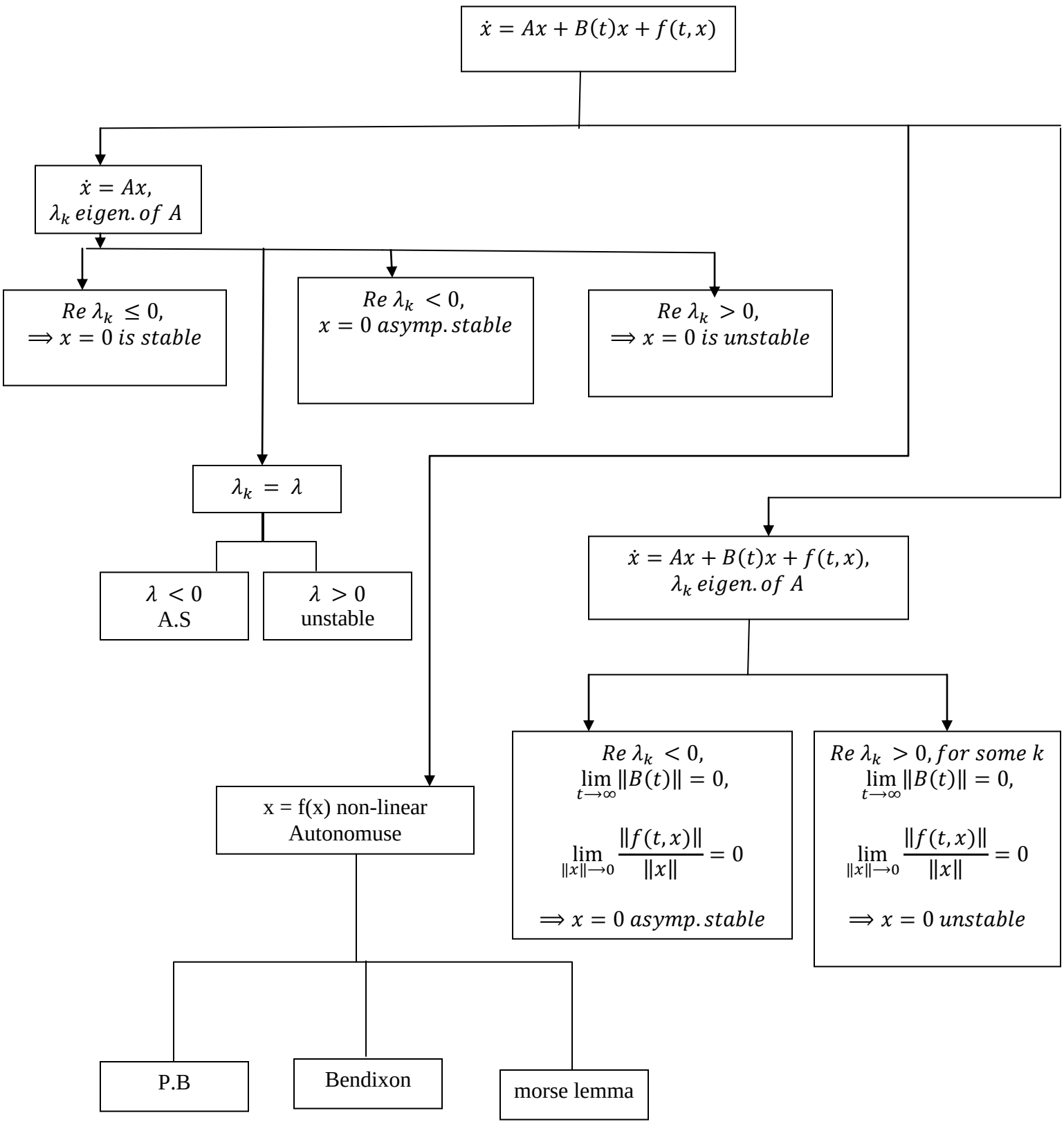
$\dot{x} = Ax + B(t)x + f(t,x)$
$\dot{x} = Ax,$
$\lambda_k\ eigen.of\ A$
$Re\ \lambda_k \leq 0,$
$\Longrightarrow x = 0\ is\ stable$
$Re\ \lambda_k < 0,$
$x = 0\ asymp.stable$
$Re\ \lambda_k > 0,$
$\Longrightarrow x = 0\ is\ unstable$
$\lambda_k = \lambda$
$\lambda < 0$
A.S
$\lambda > 0$
unstable
$\dot{x} = Ax + B(t)x + f(t,x),$
$\lambda_k\ eigen.of\ A$
$Re\ \lambda_k < 0,$
$\lim_{t\to\infty} \|B(t)\| = 0,$
$\lim_{\|x\|\to 0} \frac{\|f(t,x)\|}{\|x\|} = 0$
$\Longrightarrow x = 0\ asymp.stable$
$Re\ \lambda_k > 0, for\ some\ k$
$\lim_{t\to\infty} \|B(t)\| = 0,$
$\lim_{\|x\|\to 0} \frac{\|f(t,x)\|}{\|x\|} = 0$
$\Longrightarrow x = 0\ unstable$
x = f(x) non-linear
Autonomuse
P.B
Bendixon
morse lemma

$$\dot{x} = A(t)x + f(t,x)$$

$A(t)\ T - periodic$

$A(t)$ – $not\ periodic$,

Use theorem 7.3

$$\sum_{i=1}^{n} \lambda_i > 0$$
$$\Longrightarrow x = 0\ unstable$$

$$\dot{x} = A(t)x + f(t,x),$$
$$A(t)\ T - periodic\ ,$$
$$\lim_{\|x\| \to 0} \frac{\|f(t,x)\|}{\|x\|} = 0,$$
$$\Longrightarrow x = 0\ asymp.stable$$

$$\sum_{i=1}^{n} \lambda_i \leq 0$$

No conclusion about $x = 0$