A single step method

$$u_{j+1} = E(\lambda h)\, u_j$$

for $u' = \lambda u$ is said to be

(I) Absolutely stable if $|E(\lambda h)| \leq 1$, $\lambda < 0$

(II) Relatively stable if $|E(\lambda h)| \leq e^{\lambda h}$, $\lambda > 0$

(III) Periodically stable if $|E(\lambda h)| = 1$, λ pure imaginary