

Modified midpoint method for delay differential equations - stability analysis

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We discuss stability properties of certain discretization of linear delay differential equation

$$y'(t) = ay(t) + by(t - \tau), \quad t > 0, \quad (1)$$

where $a, b, \tau \in \mathbb{R}, \tau > 0$. In particular, we focus on a difference equation corresponding to a modified midpoint method applied to (1) and we analyze its asymptotic stability region. It is described by a set of appropriate conditions and corresponding visualization is presented. The obtained conditions are compared with the known results for the Euler method discretization applied to (1) and with stability properties of the delay differential equation (1).

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References

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