Christian Nunez

Stanley Huddy

Differential Equations

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Imaginary Coefficients

In the peer reviewed article *The linear differential equations with complex constant coefficients and Schrödinger equations* by Soon-Mo Jung and Jaiok Roh they demonstrate a possible solution to a second-order inhomogeneous linear differential equations, $y''(x) + \alpha y'(x) + \beta y(x) = r(x)$, with complex constant coefficients, by looking at some characteristics of approximate solutions to these kind of differential equations. As a practical example to this method that was applied to the time-independent Schrödinger's equations that is commonly used in quantum mechanics to describe the behavior of electrons when there is no observer.

In order to prove the existence of solution to a second-order inhomogeneous linear differential equation with complex constant coefficients, $y''(x) + \alpha y'(x) + \beta y(x) = r(x)$, where α and β are complex-valued constants and r is a continuous function with a complex-valued output. Denoting λ and μ are the roots to the characteristic equation, $x^2 + \alpha x + \beta = 0$, where p = $\Re(\lambda)$ and q = $\Re(\mu)$. Let I be any open interval between $-\infty$ and ∞.