

The differential linear system and a solution

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Abstract

In this paper, I describe the differential linear system and a solution.
The paper ends with "The End"

Introduction

In this paper, I describe the differential linear system and a solution.

The differential linear system

The differential linear system is

$$\frac{\partial x(t)}{\partial t} = ax(t) + by(t) + c$$

$$\frac{\partial y(t)}{\partial t} = dx(t) + ey(t) + f$$

A solution to the differential linear system

A solution to the differential linear system is

$$x(t) = \frac{ce - bf}{bd - ae} + e^{\frac{1}{2}t(a+e)} \left(\alpha \cosh \left(\frac{1}{2}t\sqrt{(a-e)^2 + 4bd} \right) + \frac{(\alpha(a-e) + 2b\beta) \sinh \left(\frac{1}{2}t\sqrt{(a-e)^2 + 4bd} \right)}{\sqrt{(a-e)^2 + 4bd}} \right)$$

$$y(t) = \frac{af - cd}{bd - ae} + e^{\frac{1}{2}t(a+e)} \left(\beta \cosh \left(\frac{1}{2}t\sqrt{(a-e)^2 + 4bd} \right) + \frac{(2\alpha d - \beta(a-e)) \sinh \left(\frac{1}{2}t\sqrt{(a-e)^2 + 4bd} \right)}{\sqrt{(a-e)^2 + 4bd}} \right)$$

where

$$\alpha = x(0) - \frac{ce - bf}{bd - ae}$$

$$\beta = y(0) - \frac{af - cd}{bd - ae}$$

The End