

0.1 Variation of Parameters



Theorem 0.1 ► Variation of Parameters

Given a 2nd Order ODE $y'' + p(t)y' + q(t)y = g(t)$, the particular solution of the ODE can be written in the form of

$$y_p = u_1 y_1 + u_2 y_2.$$

where y_1 and y_2 are the complementary function solutions to the homogeneous version of the ODE and u_1 and u_2 are functions of t that follow the following conditions:

$$\begin{aligned} u_1' y_1 + u_2' y_2 &= 0 \\ u_1' y_1' + u_2' y_2' &= g(t). \end{aligned}$$

The benefit to  is that derivatives of $g(t)$ aren't the limiting factor, but rather the ability to find the functions u_1 and u_2 is the limiting factor. This means  is able to find particular solutions in cases where the method of undetermined coefficients is unable to do so.

Midterm