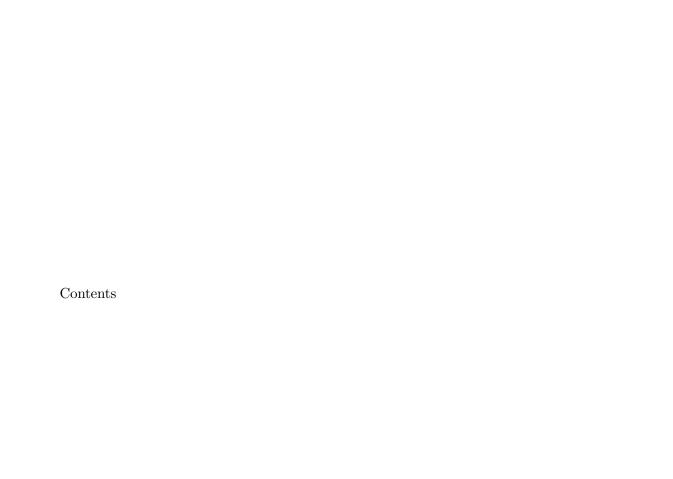
Differential Equations

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CHAPTER 1

Chapter

1. Section

PROBLEM 1.1. Let m, b, and k be a positive constant such that $b^2 - 4mk < 0$. Consider an underdamped oscillatior with sinusoidal driving force

$$m\ddot{x} + b\dot{x} + kx = A\sin\omega t$$
, $x(0) = x_0, \ \dot{x}(0) = 0$.

For convenience, define positive constants $\beta := \frac{b}{2m}$, $\omega_0 := \sqrt{\frac{k}{m}}$, and $\omega_1 := \sqrt{\omega_0^2 - \beta^2}$. The solution of this equation when A = 0 is called the complementary solution and

is given by

$$x_c(t) = x_0 e^{-\beta t} \cos \omega_1 t.$$

- (1)
- (2) Find the value of ω such that the amplitude of particular solution is maximized.