Second-Order Linear Differential Equations

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Chapter contents 1

This chapter covers equations of the form

$$y'' + p(t)\,y' + q(t)\,y = g(t),$$

which describe mechanical vibrations, electric circuits and many other systems where an acceleration depends on position and velocity. Following Boyce & DiPrima, *Elementary Differential Equations and Boundary Value Problems* (11th ed., Wiley), Chapter 3, the independent variable is now called t.

Prerequisite: First-Order Differential Equations.

Chapter contents

	Section	What it covers
3.1	Homogeneous equations with constant coefficients	Linear second-order equations, initial value problems, the characteristic equation, distinct real roots, long-term behaviour
3.2	Solutions of linear homogeneous equations; the Wronskian	*coming soon*
3.3	Complex roots of the characteristic equation	*coming soon*
3.4	Repeated roots; reduction of order	*coming soon*
3.5	Nonhomogeneous equations; method of undetermined coefficients	*coming soon*
3.6	Variation of parameters	*coming soon*
3.7	Mechanical and electrical vibrations	*coming soon*
3.8	Forced periodic vibrations	*coming soon*

Numerical methods for second-order equations (rewriting them as first-order systems) are in Numerical Methods, Section 8.