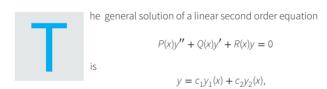
## Brannan, Boyce:

## Differential Equations: An Introduction to Modern Methods and Applications, 3rd Edi Chapter 9

## CHAPTER NINE



## Series Solutions of Second Order Linear Equations



where  $y_1$  and  $y_2$  are a fundamental set of solutions of the differential equation. So far, we have given a systematic procedure for constructing fundamental solutions only if the equation has constant coefficients:

$$ay'' + by' + cy = 0.$$

Furthermore  $y_1$  and  $y_2$  can be expressed in closed form in terms of elementary functions.

To deal with equations that have general nonconstant coefficients, it is necessary to consider alternative solution techniques. For some applications we may find that approximations using an initial value problem solver are satisfactory for our needs. However there are some variable coefficient equations that frequently recur in applications, and it is either convenient or necessary to represent their solutions by infinite series. For instance, a solution of

$$x^2y'' + xy' + x^2y = 0,$$
  $x > 0,$ 

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