

MCL 704 APPLIED MATHEMATICS FOR THERMOFLUIDS

Problem Set 6: Solution of non-homogeneous Second Order Linear ODEs with CC

Using the method of variation of parameters, solve the differential equations.

1. $y'' + 4y = 4 * \tan(2x)$
2. $y'' + n^2y = \operatorname{cosec}(nx)$
3. $y'' + n^2y = x$
4. $y'' - 3y' + 2y = \frac{\exp(x)}{1+\exp(x)}$
5. $y'' - 4y' + 3y = \frac{\exp(x)}{1+\exp(x)}$
6. $y'' - 2y' = \exp(x) * \sin(x)$
7. $y'' - 2y' = \exp(x) * \cos(x)$
8. $y'' - 2y' + y = \exp(x)$
9. $y'' - 2y' + y = \exp(x) * \ln(x)$
10. $y'' - 6y' + 9y = \frac{\exp(3x)}{x^2}$
11. $y'' + y = x * \sin(x)$
12. $y'' + y = \frac{1}{1+\sin(x)}$
13. Verify that $y_1=x$ and $y_2=x^{-1}$ are linearly independent solutions of the homogeneous equation $y'' + \left(\frac{1}{x}\right)y' - \left(\frac{1}{x^2}\right)y = 0$ Next using the method of variation of parameters, solve the non-homogenous differential equation, $y'' + \frac{y'}{x} - \left(\frac{1}{x^2}\right)y = \exp(x)$
14. Verify that $y_1=x$ and $y_2=x^2$ are linearly independent solutions of the homogeneous equation $y'' - \left(\frac{1}{x}\right)y' = 0$ Next using the method of variation of parameters, solve the non-homogenous differential equation, $y'' - \frac{y'}{x} = x * \exp(x)$
15. Apply the method of variation of parameters to solve the differential equation,
 - a. $y''' - 6y'' + 11y' - 6y = e^{2x}$

Using the method of undetermined coefficients, solve the differential equations

16. $y''' + 3y' + 2y = 6$
17. $y''' + y' = 3$
18. $y''' + 3y' + 2y = 12 * e^x$
19. $y''' - 6y' + 8y = 3e^x$
20. $y''' - y' - 2y = e^{2x}$
21. $y''' + y' - 6y = 6x$
22. $y''' - y' - 2y = 2x^2 + 5$
23. $y''' + 3y' + 2y = \sin(x)$
24. $y''' - y' - 2y = \sin(2x)$
25. $y''' - 6y' + 25y = 64e^{-x}$
26. $y''' + 2y' - 3y = 8e^x$
27. $y''' + 9y = -4x * \sin(3x)$
28. $y''' - 3y' = 2 * e^{2x} * \sin(x)$
29. $y''' + y'' = \exp(x) * \cos(x)$
30. $y''' - 3y'' + 3y' - y = -4 * \exp(x)$