

Partial Differential Equations (PDE) of the 1-st order.

1. PDE. major concepts and definitions.
2. Geometric interpretation of the statements of the Cauchy problem in 2-dimensional space.
3. Linear homogeneous PDE. Associated system. Theorem 1.
4. Linear homogeneous PDE. Associated system. Theorem (inverse).
5. Property of operator $X[f]$.
6. General solution of the Linear Homogeneous PDE. Theorem 2.
7. The Cauchy problem for the Linear Homogeneous PDE.
8. First Integrals. Theorem 3.
9. Linear non-homogeneous PDE. Major definitions.
10. The General solution of the Linear non-homogeneous PDE.
11. Special solutions.
12. The Cauchy problem for the Linear non-homogeneous PDE.
13. Theorem on General solution of the Linear non-homogeneous PDE.
14. Linear PDE ($n=2$).
15. Characteristics. Direct Theorem.
16. Characteristics. Inverse Theorem.
17. Reconstruction of the Linear PDE.

Non-Linear PDE

18. Compatibility system of two PDE.
19. Necessary condition on the compatibility.
20. Sufficient condition on the compatibility of the system.
21. Pfaff equation. Definitions. Geometrical means.
22. Pfaff equation. General solution (Case 1).
23. Pfaff equation. General solution (Case 2).
24. Pfaff equation. General solution (Case 3).
25. Pfaff equation. General solution (Case 3.a).

26. Pfaff equation.General solution (Case 3.b).
- 27.The canonic forms of the Pfaff equations.
- 28.Total,General and Singular Integrals of the non-linear PDE.
29. Total,General and Singular Integrals of the non-linear PDE in implicit form.Case1.
30. Total,General and Singular Integrals of the non-linear PDE in implicit form.Case2.
- 31.Remark,Theorem.
- 32.Geometric interpretation.Total Integral.
33. Geometric interpretation.General Integral.
34. Geometric interpretation.Singular Integral.
- 35.The Lagrange-Charpy Method.
36. The Lagrange-Charpy Method.Case1.
37. The Lagrange-Charpy Method.Case2.
38. The Lagrange-Charpy Method.Case3.
39. The Lagrange-Charpy Method.Case4 (separated variables).
40. The Lagrange-Charpy Method.Case5 (Generalized Clero equation).
- 41.Solution of the Cauchy problem for the Non-Linear PDE,if the Total Integral is known.
- 42.The Characteristic Lines.
- 43.The Characteristic Strip.
- 44.The Cauchy method of solution of the PDE of the 1-st order in 2-dimensional case.
- 45.Differential equation of the Characteristic Line.
- 46.Construction of the Integral Surface using Characteristics.Theorem.
- 47.The Cauchy Method in n- dimensional space.
- 48.The I Jacoby Method.
49. The II Jacoby Method.