Partial Differential Equations Preliminary Exam Syllabus

Department of Mathematical Sciences

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(Updated October 2020)

Four important linear partial differential equations: 1)Transport equations: initial value problems; 2) Laplace's equation: fundamental solution, mean value formulas, Green's function; 3) Heat equation: fundamental solution, maximum principle; 4) Wave equations: solution by spherical means, energy methods.

Nonlinear first-order PDEs: complete integrals, characteristics, introduction to Hamilton-Jacobi equations, and introduction to conservation laws.

Other ways to represent solutions: separation of variables, Fourier transform, Laplace transform, non-characteristic surfaces, real analytic functions, Cauchy-Kovalevskaya theorem.

This material is covered in MATH 7006.

Text:
Lawrence C. Evans, *Partial Differential Equations* (2nd edition).