ⓘ Info

This note, that was found here, as a part of a collection
is written (completely with human hands) by Rupadarshi Ray,
was created on May 27, 2025 8:20:18 PM,
was last modified on May 17, 2026 7:36:49 PM, and
was exported on September 7, 2026 3:09:50 PM.

Equations for functions on $\mathbb{R}^2$

Definition. Definition

An equation (PDE) for unkown

$$u : U \subseteq \mathbb{R}^2 \to \mathbb{R} \text{ or } \mathbb{C}$$

is a function

$$F : U \times \mathbb{R}^N \to \mathbb{R} \text{ or } \mathbb{C}$$

for which u is a solution if

$$F(x, y, u, \mathfrak{D}u, \ldots, \mathfrak{D}^\alpha u) = 0$$

for all $(x, y) \in U$.

degree		homog	non-homog
1	linear	$a(x,y)u_x + b(x,y)u_y =$	$a(x,y)u_x + b(x,y)u_y =$
	semi-linear	$a(x,y)u_x + b(x,y)u_y =$	$a(x,y)u_x + b(x,y)u_y =$
	quasi-linear	$a(x,y,u(x,y))u_x + b($	$a(x,y,u(x,y))u_x + b($
	general (non-linear)		
2	semi-linear	$au_{xx} + 2bu_{xy} + cu_{yy} =$ (linear)	$au_{xx} + 2bu_{xy} + cu_{yy} =$
	semi-linear, elliptic		$ac - b^2 > 0$
	semi-linear, hyperbolic		$ac - b^2 < 0$
	semi-linear, parabolic		$ac - b^2 = 0$
	general (non-linear)		
≥ 3			
fractional			

Current note has 0 direct children and 0 total descendants.

- stem
  - subobjects of and functions on $\mathbb{R}^n, S^n, \mathbb{C}^n$ and its quotients $_\Gamma\backslash^{\mathbb{R}^n}, _\Gamma\backslash^{\mathbb{C}^n}$
    - equations
      - Equations for functions on $\mathbb{R}^2$

And it has 5 siblings.

- stem
  - subobjects of and functions on $\mathbb{R}^n, S^n, \mathbb{C}^n$ and its quotients $_\Gamma\backslash^{\mathbb{R}^n}, _\Gamma\backslash^{\mathbb{C}^n}$
    - equations
      - Equations for functions on $\mathbb{R}^2$
      - Quasi-linear PDEs on $\mathbb{R}^2$
      - $$\partial_t^2 + \sum_{i=1}^n v_i^2 \partial_{x_i}^2 + m^2$$
      - First order PDEs in $\mathbb{R}^n$
      - $$\partial_t^2 + \sum_{i=1}^n v_i^2 \partial_{x_i}^2$$