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A STUDY OF PARTIAL DIFFERENTIAL EQUATIONS AND CALCULUS OF VARIANCE

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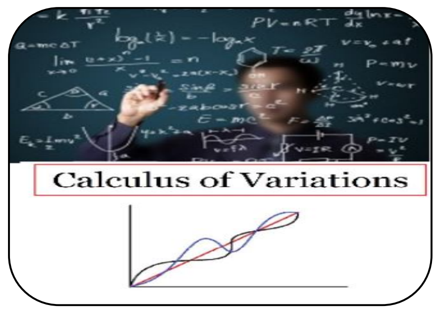
ABSTRACT

Partial differential equation is the most useful in the differential calculus we use in the mathematical field partial differential Equations are most probably used in differential calculus which is the one type of differential equation, derivatives w.r.t more than one independent variables are called partial differential equation,partial differential equations,and variance are having variable has been consider more often we will have to consider morethan one independent variables suppose It is also called partial derivatives Up to the boundary regularity results for second order linear elliptic systems in divergence form with Dirichlet or partial derivative type boundary condition are well-known. However, a large class of elliptic systems can be written more crisply in the language of diff erential forms and often,



KEYWORDS: *Boundary regularity, elliptic system, Campanato method, Hodge* ***jocobians. charpit methods'****Laplacian, lagrange's linear equations.Maxwell system, Stokes system, div- curl system, Gaff ney-Friedrichs inequality, tangential and normal boundary condition.*

INTRODUCTION:

Ex : Let f(x,y) is a functions of two valuables and f(x,y,z) is also functions of three valuables. Let f(x,y) be a continuous funtions of x,y,z changes when x changes or y changes or when both x,y changes, when x changes y remains constant, when y changes x remains constant, partial differential denotes as $\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}, \frac{\partial f}{\partial z}$ etc. In partial differential equation orpartial derivatives are two,three and n types (1) first order (2) second order (3) n^{th} order

Ex : - i) $\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}, \frac{\partial f}{\partial z}$ are called first order partial differential equation

ii) are called second order partial differential equation $\frac{\partial}{\partial r}\left(\frac{\partial f}{\partial n}\right) = \frac{\partial^2 f}{\partial n^2} = f x_2$ In generally $\frac{\partial 2f}{\partial v\, \partial x} = \frac{\partial zf}{\partial x - \partial y}$ order of partial differentiation is independent.

In partial differential having "Homogeneous Functions" of f (βx, βγ) = β^nf (x,y)then f (x,y) is called also homo geneous function in degree n. Till now functions of one variable has considered.we will have to consider functions of more than one independent variable. Partial differential equations having total derivative and total differential, for example let u=f(p,q) –(1) Where p=∂(t), q = β (t)-(2) where p and q are functions of single valuable. In equation (1) or (2) have single valuable t, is $\frac{du}{dt}$ is called total derivative with respect to t.1

Let. ∂u, ∂x, ∂y, changes p and q corresponding to the change ∂t in t is $\frac{du}{dt} = \frac{\partial u}{\partial p}; \frac{dp}{dt} + \frac{\partial u}{\partial q}. \frac{dq}{du} \because f$ (p,q)=u. partial differential equations having many applications which has more than one Independent variable (1) equations of conic in polar form (2) Jacobians (3) Polar co-ordinates etc. for such systems, neither of those is the relevant boundary condition. A typical example is the Poisson problem for the Hodge Laplacian with prescribed 'tangential part' or prescribed 'normal part'on the boundary respectively, namely the systems,$\nu \wedge \omega = 0$ on $\partial\Omega$.or $\nu y\omega = 0$ on $\partial\Omega$. $\delta d\omega + d\delta\omega = f$ in ΩWe prove existence and up to the boundary regularity estimates in L^p and H¨ol $s\delta(Ad\omega) + B^T d\delta(B\omega) = \lambda B\omega + f$ in Ω,with either $\nu \wedge \omega$ and $\nu \wedge \delta(B\omega)$ or $\nu yB\omega$ and $\nu y(Ad\omega)$ prescribed on $\partial\Omega$. The proofs are in the spirit of 'Campanato method' and thus avoid poten-tial theory and do not require a verification of Agmon-Douglis- Nirenbeor Lopatinskii-Shapiro type conditions. Applications to a number of re-lated problems, such as general versions of the time-harmonic Maxwell system, stationary Stokes problem and the **'div-curl'** systems, are included Partial differential Equations (PDEs) are accomplished the application of the variance in PDE.

OBJECTIVES:

1. To Understand the steps of partial differential equation in differential Calculusand its variance
2. To know about natation's of partial differential equationsand variance.
3. To know different Mathematician, solve the various problems related to variance
4. To form the different types of partial differential equations.
5. To understand the solving partial differential equations related to variance field.

RESEARCH METHODOLOGY

According William green wald: variance mean of squared deviation obout the mean of a sequence, boundary regularity, elliptic system, Campanato method, Hodge Laplacian, Maxwell system, Stokes system, div- curl system, Gaffney-Friedrichs inequality, tangential and normal boundary

$v_i(t) = \mathrm{sgn}(r(t) - s(t))$,
$A\, dt\, x(t) + B\, x(t) = c(t), \quad t \in (t_0, T]$, —

with given initial value $x(t_0) = x_0$, where $x(t) \in RNs$ is the unknown solution vector consisting for example of currents and voltages, $A, B \in RNs\times Ns$ are matrices, and $c(t) \in RNs$ is the right-hand side containing current and voltage sources, e.g., the pulsed voltage $v_i(t)$. The system may be assembled from lumped element descriptions based on loop or (modified) nodal analysis as described in Please note, that we focus on the linear case but the approach can be straightforwardly generalized, e.g., considering $B = B(x)$. Furthermore, a global strong solution $x(t)$ may not exist due to the switching of the right- hand side solution. The large end time point T while the fast dynamics due to the switching enforce small time steps.

This is the motivation to turn to efficient methods that can the two ingredients of Parareal are the fine and the coarse propagators. We denote by $F(t, t_0, x_0)$ and $G(t, t_0, x_0)$ the solutions of the IVP (2) at $t \in (t_0, T]$ obtained with sequential time stepping using fine and coarse time steps, respectively. Partitioning the time interval $t_0 = T_0 < T_1 < \cdots < T_N = T$ we write the parallel iteration: for k=0,1,....and n=1,...,N solve $X^{(k+1)}=x_0X^{(k+1)} = F.T_n, T_{n-1}, X^{(k)} \Sigma + G.T_n, T_{n-1}, X^{(k+1)}\Sigma - G.T_n, T_{n-1}, X^{(k)n-1.}$ The solution operator F is assumed to deliver a very accurate solution (e.g., using a numerical time-integration method with small time steps δT) and can be executed in parallel, while G gives rough information about the solution using a cheap method (e.g., using a numerical method with large time steps $\Delta T_i = T_{i+1} - T_i$) and has to be calculated sequentially. captures the high frequency behavior was introduced. The idea is to separate the high frequency (pulsed) components from the low frequency components, i.e., A dx/dx(t) + B x(t) = c¯(t) + c˜(t),= c¸(t) -A(1)

where c¯ can be given as a few low-frequency sinusoids from a (fast) Fourier transform and c˜(t) := c(t) = c¯(t) is the remainder. This allows to define a reduced coarse propagator G¯fft which solves

dx Ax(t) + B x(t) = c¯(t) dt

Two particular differential operators on cial significance for us. A differential (k + 1)-form

$\phi \in L^1 (\Omega; \Lambda^{k+1})$

is differential forms will have a special called the exterior derivative of ω Ω; for all η ∈C∞ η ∧ ϕ = $(-1)^{n-k}$dη ∧ ω,Ω ΩΩ; Λ^{n-k-1} . The Hodge codifferential of ω∈ L^1∈L^1 Multirate PDEs. The MPDE approach, which is used for obtaining the coarse solution in Parareal uses the MPDE. Its application to yields

$$A \frac{\partial x}{dt}(t1, t2) + \frac{\partial x (t1, t2)}{\partial t2} + \frac{\partial x}{\partial t_1} B x \ (t1,t2) = Cx (t1, t2), \text{-(2)}$$

where the relation between the original and the MPDE solution and righthand side are given by x(t, t) = x(t), c(t, t) = c(t).This implies that if a solution (1) is found, the solution of (2) can be extracted from it. The MPDEs allow us to split the power converter solution which consists of a slowly varying envelope and fast periodically varying ripples explicitly using a solution expansion by variance method.

CONCLUSIONS:

The importance of partial differential equations and variance due to their recent occurrence in the study of many processes in science and engineering, statistics and also the various limitations posed by the integer order derivative for making the study put up in the thesis entitled Partial Differential Equations The study of symmetries and exact solutions of nonlinear partial differential equations has great theoretical and practical importance. These exact solutions for nonlinear systems are used as models for physical or numerical investigations and often replicate qualitatively on the behaviour of more complicated solutions. More specifically, the thesis deals with nonlinear partial differential equations of fractional order representing some interesting physical systems which are the space time fractional Burgers Poisson equation, time fractional potential Burgers' equation, variable coefficient space-time fractional potential Burgers' equation, time fractional Gardner and space time from the view point of their underlying Lie symmetries of infinitesimal transformations. the solutions obtained are of very specific nature and further application of Lie group method on the reduced system led only to trivial symmetries. Thus, the general solution of reduced ODEs, their physical interpretation and the study of higher order symmetries of fractional order differential equations bring forth tremendous scope for future work.

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