I. reflector antenna feeds. The chapter comes to
from 1888 to 1983 in detail. This is conducted
experiments are given at the end of the chapter.

SET-UP AND METHODOLOGY
the experimental set-up and the methodology
reflector antenna feeds. The chapter comes to
results are given at the end of the chapter.

RESULTS
theoretical discussion of the modification antenna.
expected here. The surface density pattern using the resultant expression was
the radiation pattern. Further theoretical calculations
the limitations of the theory, and practical
integral expression is also derived.

IND SUGGESTIONS FOR FUTURE WORK
highlighting the significance of the present
of the work to study the radiation patterns of
the radiation pattern of E-plane horns is studied
for obtaining identical E- and H-plane patterns

from the E-plane sectoral horn is established here. Experimental results for a
number of horns with flanges of various parameters are presented here.

S.P.27. BABY, B.V.: Some Non-linear Problems in the
Theoretical Physics - 1985 - Dr. K. Babu Joseph

An immense variety of problems in theoretical physics are of the non-linear type. Non-linear partial differential equations (NPDE) have almost become
the rule rather than an exception in diverse branches of physics such as fluid
mechanics, field theory, particle physics, statistical physics and optics, and the
construction of exact solutions of these equations constitutes one of the most
vigorou solutions in theoretical physics today. The thesis entitled "Some Non-linear
Problems in Theoretical Physics" addresses various aspects of this problem at
the classical level. For obtaining exact solutions, we have used mathematical
tools like the bilinear operator method, basic equation technique and similarity
method with emphasis on its group theoretical aspects.

A new era in theoretical physics was ushered in by the discovery of a non-linear
transformation called inverse scattering transform (IST) and the stability of
a particular solitary wave solution, called soliton, of a class of NPDEs by
Gardner, Greene, Kruskal and Miura [1] and Zabusky and Kruskal [2]. Further
rapid development added a number of non-linear field theoretical models such
as Korteweg-de Vries (KdV), two-dimensional sine-Gordon (sG), non-linear
Schrodinger, Thirring model etc. The solitary wave solutions of an integrable
system are often called solitons [3] which are either topological or non-topological,
depending on the non-vanishing or vanishing of the topological charge. Equations
such as KdV, sG etc. belong to this class that is characterized by the existence
of an infinite number of conserved quantities. Backlund transformation (BT)
constitutes one of the oldest approaches to the solution of NPDEs. The method
of prolongation structures has been introduced recently to support the studies
using IST and BT.

The bilinear operator method pioneered by Hirota [4] is closely associated
with the numerical method of Padé approximants. We have applied this method
to develop single solitary wave solutions of the Double sine-Gordon (DshG)
equation in (1 + 1) dimensions. The DshG system is a newly introduced system
and bears close resemblance to the Liouville and the Toda models. For massive
and massless $\phi^4$ equations this method yields some previously known solutions.
Non-abelian gauge theories of the Yang-Mills (YM) type are of great interest
in contemporary field theory and particle physics, especially in the context of
unidentified field models of fundamental interactions. By using some suitable ansatz
one can reduce the SU(2) YM or YM-Higgs theory to non-linear differential equations
(NDE) (the massless $\phi^4$ equation, or one-dimensional Liouville equation) or to a
set of coupled NPDEs. Euclidean space solutions of the massless $\phi^4$ equations
lead to the celebrated instanton and monopoles of SU (2) pure YM theory. Monopole
solutions of YM-Higgs system can be obtained from the one dimensional Liouville
equation or a pair of coupled NPDEs.

We have used the singular solutions of the massless $\phi^4$ model to generate
are interpreted as localized fluctuations involving no flux transport. It is conjectured
that these objects having infinite action and infinite topological charge, closely
resemble the monopole and may play a tunnelling role. The idea of employing the
solutions of a known differential equation to construct a solution of a given NPDE
was developed by Pinney, Red adnd Burt [5] who called it the base equation technique. Using this approach we developed multisolitary wave solutions of the DsG system in arbitrary dimensions, which collapse to a single solitary wave in (1 + 1) dimensions.

We have developed a generalisation of the base equation method and called it the composite mapping method, wherein a sequence of maps is applied to several members of the non-linear Klein-Gordon (NKG) family to produce new solutions. In a broad scenario like this where one deals with a whole class of NDEs rather than a specific one, besides yielding new solutions, this procedure can expose certain 'family relationships' between different equations which we later confirmed through the similarity group method. Starting from the classical Oe equation we have generated through sequential maps, arbitrary dimensional solutions of Liouville, double sine-Gordon (DsG), massive and massless Oe equations of the NKG family by imposing simple constraints at each stage. While all other known solutions of the DsG collapse to a single wave in (1 + 1) dimensions, our solutions behave differently. Since all the four distinct solutions obtained by us can be simultaneously constructed for given values of a parameter, it will be possible to study their interactions. In this context we have also highlighted the appearance of one set of solutions and the disappearance of another set at a critical point.

The Lie point transformation theory has emerged as a most outstanding attempt to study continuous symmetry, particular solutions and dimensional reduction of NPDE S [6]. When a second order NPDE is invariant under these transformations, it is possible to reduce the number of independent variables by one, and find similarity solutions of the equation [7]. In general the similarity transformations form an extended group, the similarity group, which upon a suitable redefinition of the generators, leads to the Poincare group in the case of Klein-Gordon (KG) equations. This suggests a three-fold classification of solutions of two dimensional KG equations into translation invariant, hyperbolic rotation (boost) invariant and similarity invariant types. Similarity invariance denotes invariance under the full similarity group. Such a description emphasises the behaviour of the solutions rather than that of the equations. Most of the known solitary wave solutions are of the translation invariant type. We have produced rotationally invariant solutions of several NKG equations. The group theoretical meaning of the base equation technique has also been examined. We have found that the similarity groups of the original equation and the constraint equation are identical in all the cases studied in the literature.

It has conjectured that the existence of the Painleve property (PP) (i.e., the absence of movable critical points) is a signal to the original equations integrability. We have shown that the translation-invariant sector of the SG equation does not possess PP whereas the rotation invariant sector does possess PP. This may restrict the integrability property of the SG system in some sense.

The SU (2) Yang-Mills field interacting with a Higgs scalar triplet is known to give monopole solutions through the 't Hooft ansatz. Prasad and Sommerfeld developed spherically symmetric solutions to this system in a special limit in the static case. Afterwards several attempts obtain time-dependent exact solutions. We analyse the coupled system of equations model equations and shown that the equation form under the similarity group or under gives two new exact time-dependent solutions.

The material reported in the present text of the following papers:
1. Solitary wave solutions in double sine-Gordon system by Prasad and Sommerfield [7].
2. Fluctuations in SU (2) Yang-Mills theory of the Oss G system by Prasad and Sommerfield [7].
4. Symmetry classification of solutions of two-dimensional KG equations by Prasad and Sommerfield [7].
5. Classical SU (2) Yang-Mills-Higgs system by Prasad and Sommerfield [7].

S.P.28. RADHAKRISHNAN, P.-N. PLASMA DAMAGE TO THIN FILMS, TWO-PHOTOPLASMA STUDIES-1986-Dr. K. Saiti

Laser-induced damage is the principal operation of high-power laser systems. Therefore, an understanding of its properties is crucial to laser operation. This dissertation is divided into five sections: laser damage to thin films, two-photon damage studies-1986-Dr. K. Saiti.
emn Burt [5] who called it the base equation method and called
1. Klein-Gordon (NKG) family to produce new
2. Higgs sector does possess PP. This may
3. Higgs triplet is known to
4. refractive index, absorption and thickness. An inverse dependence on absorption
5. the impurity damage model. In the case of damage to transparent polymers the

The material reported in the present thesis has been published in the form of the following papers:
3. Composite mapping method for generations of kinks and solitons in the
4. Symmetry classification of solutions of two dimensional non-linear Klein-Gordon-
5. Classical SU(2) Yang-Mills-Higgs system: Time-dependent solutions by similarity

damage to thin films, two-photon excited fluorescence and
plasma studies-1986-Dr. K. Sathianandan.

Laser-induced damage is the principal limiting constraint in the design and
operation of high-power laser systems used in fusion and other high-energy laser
applications. Therefore, an understanding of the mechanisms which cause the
radiation damage to the components employed in building a laser and a
knowledge of the damage threshold of these materials are of great importance
in designing a laser system and to operate it without appreciable degradation
in performance. This thesis, even though covers three distinct problems for
investigations, wavelength and pulse width were maintained constant. Analysis
of damage has been mainly carried out as a function of the film properties such
as refractive index, absorption and thickness. An inverse dependence on absorption
and film thickness observed for Spray Pyrolysis Deposited (SPD) and radio
frequency (rf) sputtered films in the present investigation gives firm support to
the impurity damage model. In the case of damage to transparent polymers the

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