CHAPTER - X

ON THE FUTURE DEMAND OF TWEENTYFIRST CENTURY

The works put forward in the present context is related to some problems which are either new or extended version of new approaches to some old problems. However, it appears to the present author that there are several spheres which still remain vacant and researchers should put allout efforts to fill in the gaps.

Modern structures are often subjected to severe loads,vibrations and high temperature such as wind pressure, adiabatic and isothermal compressions or expansions,heat flux, high energy sound waves, shock waves,bomb-blasting thrust, earthquake etc. Due to these,the application of classical plate and shell theories for small deflection becomes inadequate for practical purposes. For large amplitude vibrations and deflections, the non-linear analysis of such problems becomes imperative for design engineering and modern technology. Usually the standard procedure for analyzing the structures exhibiting large deflections is to apply von karman field equations/15/.

As these fourth order non-linear differential equations involve the deflections and membrane stress functions as two dependent variables coupled together, the solution of complex problems require considerable computations. For this reason, H.M.Berger[20] offered a simplified set of equations neglecting the second strain in-variant in the middle surfaces of the plates and shells without providing rigorous physical justification. Following Berger and Karman many workers published a large number of papers based on practical problems. But these are not sufficient because research itself possesses dynamicity to incorporate the present day need of the rapid changing world and as a result field of investigations is always expanding. Moreover, no approach or method can be used to findout solutions generally for truely complicated problems. It seems to the present author that a general method for approximate solutions of Karman or Karman type equations appears to be essential to investigate without impossing any hypothetical restrictions or simplifications. So, it should be treated as a burning question of the present and future day needs.

From a related literature study it reveals that many works have been done on plates and shells problems considering mostly having regular boundaries or geometry of the structures. There is dearth of literature in which irregular shaped plates and shells are dealt with the same sort of approximations and equations. So, it is also essential for the investigators to study elaborately the analysis of such problems. The present author aims at investigating such problems as a collaborative work with Dr. M.M.Banerjee in his proposed post-doctoral research works.

Many papers have been published on variable-thickness-problems, especially on plates and shells, considering Karman or Karman type equations which involve some variable parameters. It seems to the present author that investigations considering the effects of variations of each and every parameter involved in a particular study, requires special attention from practical point of view. However, dealing with such problems is not so easy rather a difficult one, yet it should have to be attempted for future demand.

Since global economy changes rapidly and usage of heavy as well as light structures with some special characteristics are gaining momentum day-by-day, hence use of plastic material with other increases at a high inflation rate. Though a large number of papers have been published on plasticity, based on Ilyushin's (1948) [177] small deflection theory, still it is quite insufficient for present and future day needs. Most of the works are confined to simple ideal cases. But the modern structures do experience severe loads, vibrations and temperature, so a vast field of study is left out to the future workers to investigate problems of practical interest with elastic plastic materials.

It is important to note that in dealing with problems related to structures of plastic material, the investigators should have to impose greater emphasis on the application of temperature field, which would involve (as apprehended by the present author) a high non-linearity in both geometry of the structure and material used, considering their tolerence or in the governing differential equations.

So, attempt is to be made to investigate the exact range of temperature variation both theoretically and experimentally.

Futhermore, the present author, being a student of physics, feels that search for an extra hard solid with very high elastic constants is an absolute necessity to meet up the future demand of the world. In this context, mention may be made for which material may exhibit such a property . As for example (though yet not discovered) the solid structure or crystal lattice of sulfur molecules might exhibit such extra-strong behaviour. But it is a great problem to the scientists to assemble sulfur molecules in a three dimensional space lattice or in a crystal with strong linkage-bonds which are prevailing in sulfur molecules. It may be apprehended that if such extra-strong solid is discovered then its application will lead to enomous benefit to the human society in general. The said material is expected to possess the following properties;

(i) light, (ii) extra-strong, (iii) bullet proof, (iv) tolerability to very high temperature, (v) high resistance to damage due to natural calamity,(vi) high melting point (34700°C)/203/ etc.

If one would be able to construct such a solid with atoms retaining the same bonds that act in a molecule, the result would be an extremely strong crystal having the above mentioned properties and works shall be generously rewarded /203/.

In fine, it may be concluded that research for any particular topic by a particular worker cannot be carried out successfully until it becomes a collaborative work. It is now felt that collaboration in the scientific field has become an absolute necessity. Hence,collaborative work appears to be essential to meet up the above global needs, mentioned in this chapter, and this could only be achieved if national and international efforts are made for which both government and non-government agencies should come forward generously.