Finite elemental Problems

All materials are made up of substance /matter. Matter is made up of elements. Elements are made up of particles. Each and every substance either naturally formed or created artificially by human beings. They are classified into two types the first one is Structural or non-Structural by its physical form. The substance that does not have and physical geometry or those which takes the shape of its containers are called non-structural elements. The correct example for this is gases and liquids. The structural items are those which are used as machine components, truss and beams, etc. Generally we classify states of substance as Solid, Liquid and Gasses but we also classify the fourth state recently as plasma state (such as fire) products are considered as non structural items. The problems related with the structural properties like load bearing capacity of trusses, beams and working capability of machine parts are defined as structural problems. The Flow characteristic , resistance and resultant pressure transfer of mass of liquid and gasses the non structural products are termed as non structural problems and also the functioning characteristic heat of fire(flame) ,steam, flue gases and sunlight as heat transfer ,temperature at a spot or particular locations are also considered to be a non structural problems. In general the Liquid and Gas products and plasma product related problems are non structural problems. The solid shaped products related problems are termed as structural problems.

Mechanics

When materials are loaded their particles displaces or dislocates from its original position. This dislocation of particles and their resultant effects to be considered are known as Mechanics of Materials. All materials posses some properties and their classification are studied under the headings as that of 1. Mechanical Properties 2. Thermal Properties 3.Electrical Properties 4. Physical Properties 5. Optical Properties 6. Acoustical Properties 8. Magnetic Properties 9. Metallurgical Properties. Out of these Mechanical properties and Thermal properties are mainly focused in Finite element Analysis. The main Mechanics to be studied as for as Finite Element Analysis are Solid Mechanics and Fluid Mechanics.

Solid Mechanics

Solid components (structures) are employed to withstand loads in ever so many trusses, beams and in Machines. What ever work being done by a Solid component a force (load) is needed for doing that work? This in turn (the applied load) makes the solid component to get deformation. In other word the dimensions of the parts will deviate in those components of Structural. It is nothing but there is an increase or decrease from its original values due to their particles dislocation. Generally in Solid materials occurrences of linear displacement of metal particles known as elongation is mainly due to tensile loads.

This occurrence of change in dimension depends 1. Type of load 2. Amount of Load 3. Direction of load acting 4. Strength of materials 5. Shape of the solid components 6. Load acting area 7. Environment in which load acts. Mostly light metals deforms largely than that of hard metals. For example material like Brass, Copper and Aluminum will deform more than the hard materials like Steels. The deformation also will be huge for more loads. The load directions like axial, torsion and radial will also decide the deformation limits and the shape or geometry of component will also decide the amount of deformation due to its complexity or simplexes. In general the behavior of materials (deformation) due to these seven influencing factors as for as in solid materials are known as Mechanics of Solids or Solid Mechanics.

Mechanics of Fluids

The Fluid subjected load moves fast manner or dislocates in faster rate due to its particles movement and hence the movement of fluid particles occurs continuously. This movement of the fluid particles is specified as mass transfer in fluid or liquid whereas in Solids it is termed as deformation. This fluid particle movement is mainly due to the intermolecular attraction. This attraction diminishes very well when the fluid gets heated up. When fluids heated up its intermolecular attraction due to choesitiviity and viscosity reduces and the flow becomes faster as the intermolecular attraction minimized. At this stage the fluid is said to have influence of process called convection. The main root cause for the heat flow is this process known as convection process. It is nothing but the movement of less weight molecules of fluid to the upper side of the container and the more weight molecules of fluid at top level of container reaches the bottom side of the vessel due to the nature of gravity force due to self weight of the molecules of fluid. Usually Fluids have no shape and takes the shape of the container. The important to be considered in fluid is its compressibility and flowability. Further classifications proceeds with compressible fluid and incompressible fluid. Likewise as for as flowablility it is classified as thick fluid with high viscosity and thin fluid with low viscosity. The performance of the fluid depends on these qualities only. If mass transfer is restricted due to viscosity the pressure is exerted. This pressure is to be concerned while using this as working substance as for as the safety of the container. In general the behavior of fluids (flowability) due to these two influencing factors as for as in fluid materials are known as Mechanics of fluids or Fluid Mechanics.