FRACTURED RESERVOIRS

- The study of the geology of a fractured reservoir requires the study of the relationship between the fracturing process and the geological events which took place during this phase. This includes the elaboration of a correct theory of fracturing and a valid diagnosis of the features of a fractured reservoir.
- Rock fracturing will most commonly have a tectonic origin, differential the fracturing depends on the pattern of mechanical stresses of the rock material and rock properties. Hence, the results of fracturing, such as fractureopenings, size, distribution, orientation, etc., will be related to stresses and type of rock (brittle or ductile), structural conditions, depth (overburden stress), lithology,
- bed thickness, etc.rates of diagenesis and lithification.

- Fractures which are generated as the result of stress which reduces rock cohesion
- can be attributed to various geological events, such as:
- a. diastrophism in the case of folding and faulting,
- b. deep erosion of the overburden, which will cause a differentiated stress on the rock through the planes of weakness,
- c. rock volume shrinkage as a result of loss of water when pertaining to shale or shaly sands.
- d. rock volume shrinkage in the case of a variation of temperature in igneous rocks.

THE JOINTS

- Joints:- are cracks formed in the rocks that are subject to stress without any sliding or movement on both sides of the slit as aresult.
- The most prominent joints occur in the most well –consolidated;
- lithified, and highly component rocks such as Sandstone ,Limestone
- ,Quartzite ,and Granite.

Types of Joints

A-classification of establishment

1- **Tectonic joints :-** are joints that formed when the relative displacement of the joint “ walls is normal to it’s plane as the result of brittle deformation of bedrock in response to regional or local tectonic deformation of bedrock.

2- Hydraulic joints :- are joints thought to have formed when pore fluid pressure became elevated as a result of vertical gravitational loading.

3- **Exfoliation joints :-** are sets of flat-lying ,curved and large joints that are restricted to massively exposed rock faces in an deeply eroded lands cape (fan-shape).

- **4- Unloading joints or release joints :-** are joints formed near the surface during uplift and erosion as bedded sedimentary rocks are brought closer to the surface during uplift and erosion, They cool ,contracted and become relaxed exastically. This causes stress build up that eventually exceeds the tensile strength of the bedrock and result in the formation of jointing .

- **5-cooling joints :-** are columnar joints that result from the cooling lake or flood of either Lava from the exposed surface of a lava basalt flow or the sides of a tabular igneous .

classification of joint s by geometry

- **1-Nonsystematic joints:-** are joints that are irregular in form ,spacing ,and orientation that they can't be readily grouped in to distinctive, through- going joint sets.

- **2-Systematic joints:-** are planar, parallel, joints that can be traced for some distance and occur at regularity evenly spaced distance on the order (cm ,m ,tens of m, or even hundreds of m) as result , they occur as families of joints that form recognizable joint sets .

- 3-Columnar jointing :- is a distinctive type of joints that join together at triple junctions either at or about 120° .These joints split a rock body into long ,prisms , or columns

THE TYPES OF SYSTEMATIC JOINTS

1- **Longitudinal joints:-**which are roughly parallel to fold axes and often fan around the fold .

2- **Cross joints :-** which are approximately perpendicular to fold axis.

3- **Diagonal joints :-** which typically occur as conjugate joints sets that trend oblique to the fold axes .

4- **Strike joints :-** which trend parallel to the strike of the axial plane of a fold .

- 5- **Cross-strike joints:-** which cut across the axial plane of a fold.