Fold and Folding:

* Fold:- A fold is represented by a curved surface or a stack of curved surfaces whose initial curvature has increased by deformation.

→ Since stratification in undeformed sedimentary beds is planar within a short distance, a distinctly curved or wavy stratification surface is commonly described as a fold.

→ cross-stratified, stratified beds may show initial curvature of foreset laminae such initially curved bedding laminae are said to be folded if the initial curvature is perceptibly increased by deformation. In that sense overturned cross-beds are also considered fold.

→ Folds can be of various scale that is from regional scale to microscopic scale.

The concept and definition

→ We mostly observe folds defined by the deformation ~~included~~ induced curvatures of sedimentary bedding planes, however folding is possible and also commonly observed in any layer having competence contrast with associated layers. These include dikes, veins, metamorphic / igneous compositional layers, foliations etc. In general, fold generating layers are commonly termed as "form surfaces".

* Why studying fold is important.

→ Fold are studied to reveal their 2D and 3D geometries.

→ The shape, orientation and extent of folds are of critical importance in finding economically valuable deposits and predicting their continuity.

→ Studying folds and associated structures (foliation, in particular) are also important in revealing the tectonic processes in Earth. The variety of folded structures and shapes record significant information of the many physical, chemical and mechanical aspects of the deformation.

Elements of single-layer folds

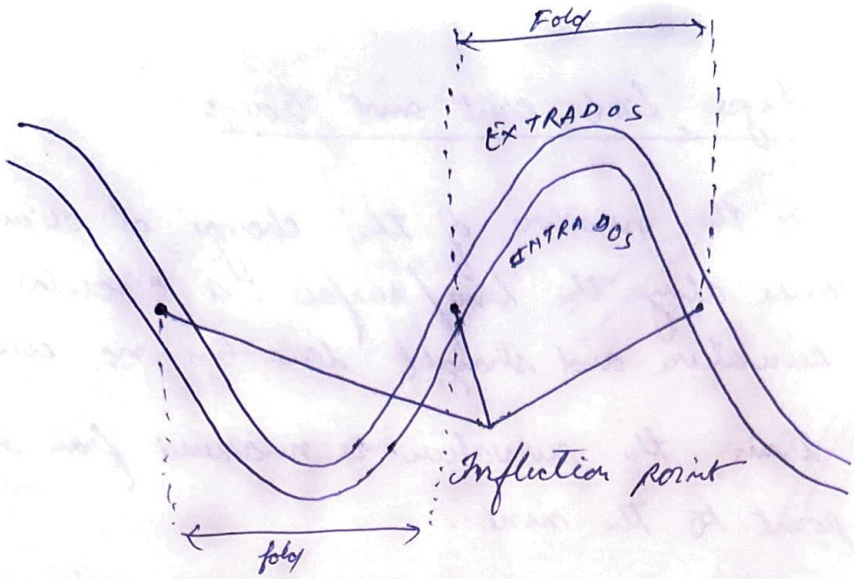
Inflection point and Fold train

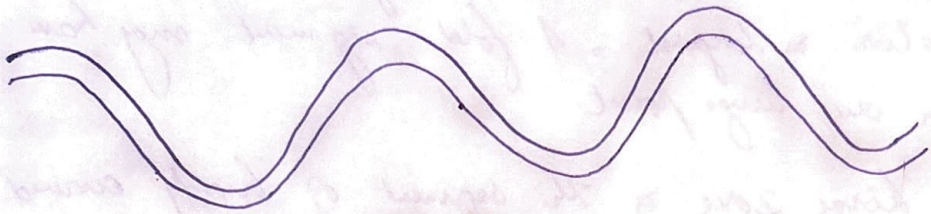
→ The trace of a folded surface appears as a ~~curve~~ wavy line on the plane, where the waviness is seen at its best.

→ A point which separates a convex and concave segment of the wavy line is called an inflection point. In other words, the point of inflection is separating on the transverse profile, fold segments of opposite senses of curvature.

→ The outer- and the inner-arc in fold are <u>Extrados</u> arc and <u>intrados</u> respectively.

→ A fold train is a series of folds with alternating senses of curvature.



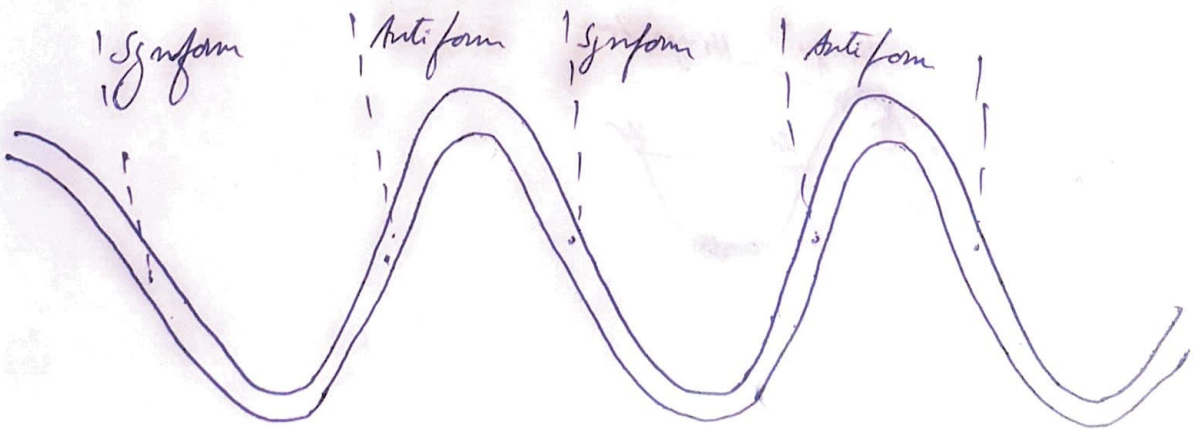


Fold train

Antiform and Synform

→ Fold segments which are convex upward, are antiforms and folds that are concave upward are synforms.

→ A fold train is generally characterized by alternate antiforms and synforms.



Curvature, Hinge, Limb, crest and Trough

→ Curvature is the measure of the change of orientation per unit distance along the line/surface. a Circular arc has constant curvature and straight line has no curvature.

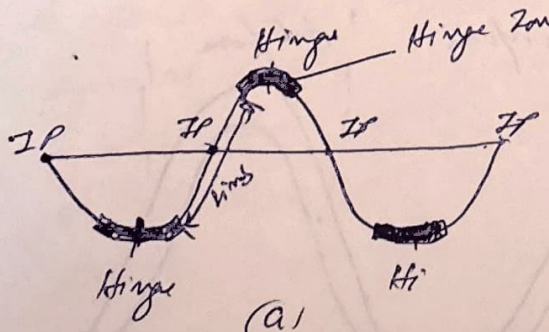
→ In a fold train, the curvature is measured from one inflection point to the next.

→ In this curved segment, the hinge is point where the curvature is largest. A fold segment may have more than one hinge point.

→ The hinge zone is the segment of highly curved line around the hinge point.

→ The limbs (flanks) are regions of lowest curvatures and includes the inflection points.

→ The crest and trough points are the points of highest and lowest elevations in a fold train, respectively crest and trough sometimes they coincide with the hinge point and sometimes they don't.



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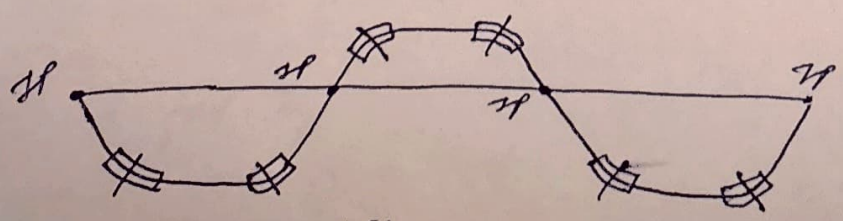

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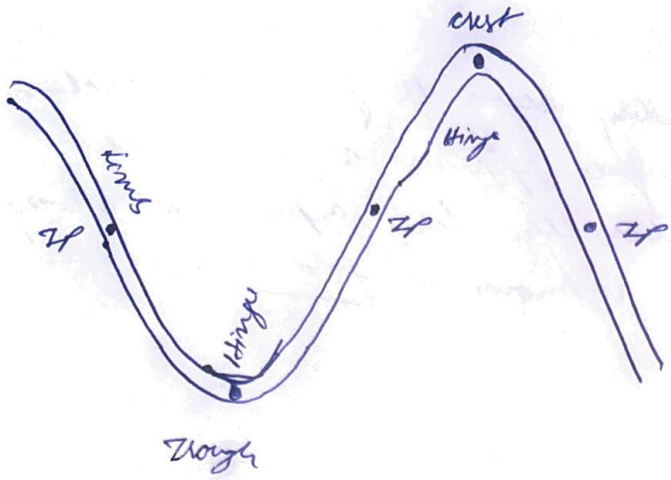

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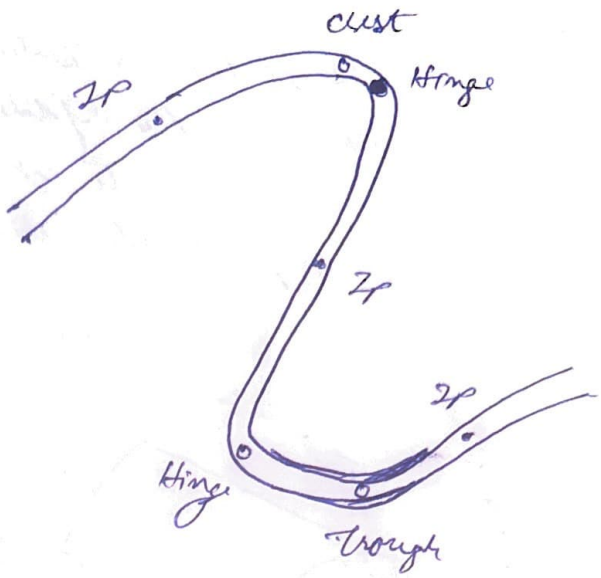
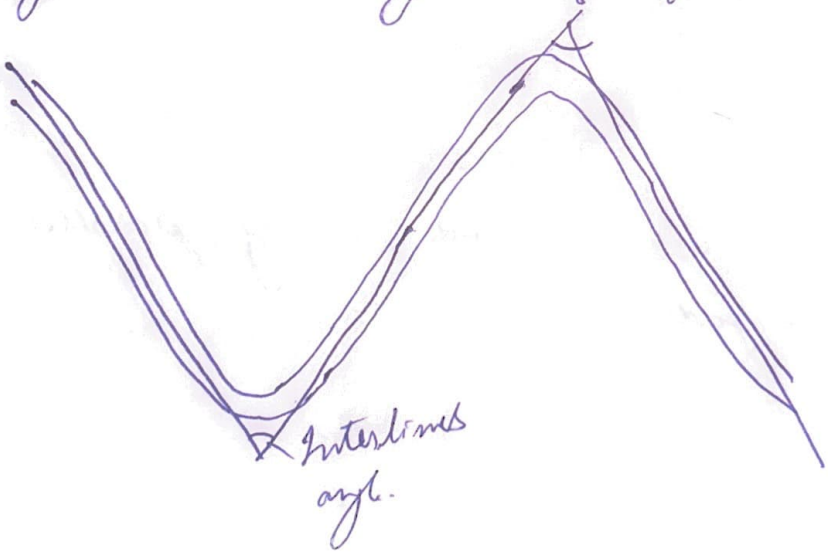


Interlimb ~~tip~~ angle

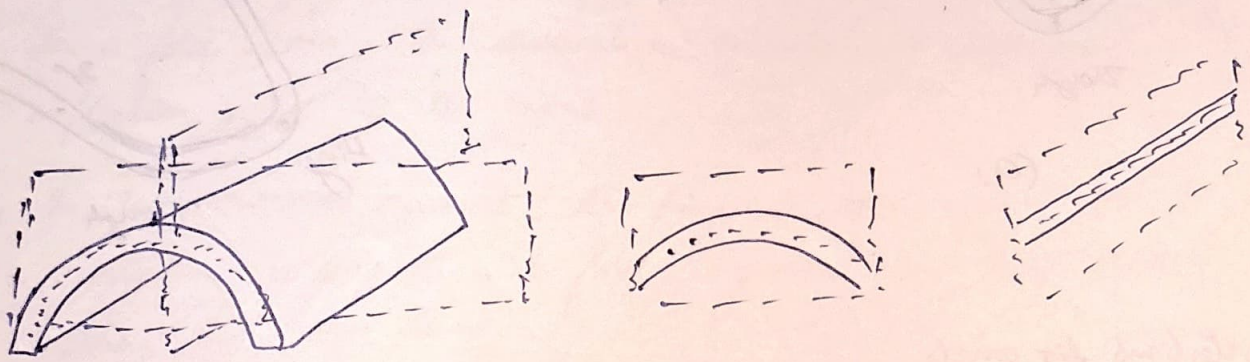
→ Interlimb angle of a folded layer is the angle enclosed by its two limbs.

→ Interlimb angle measures the tightness of the folded structure.

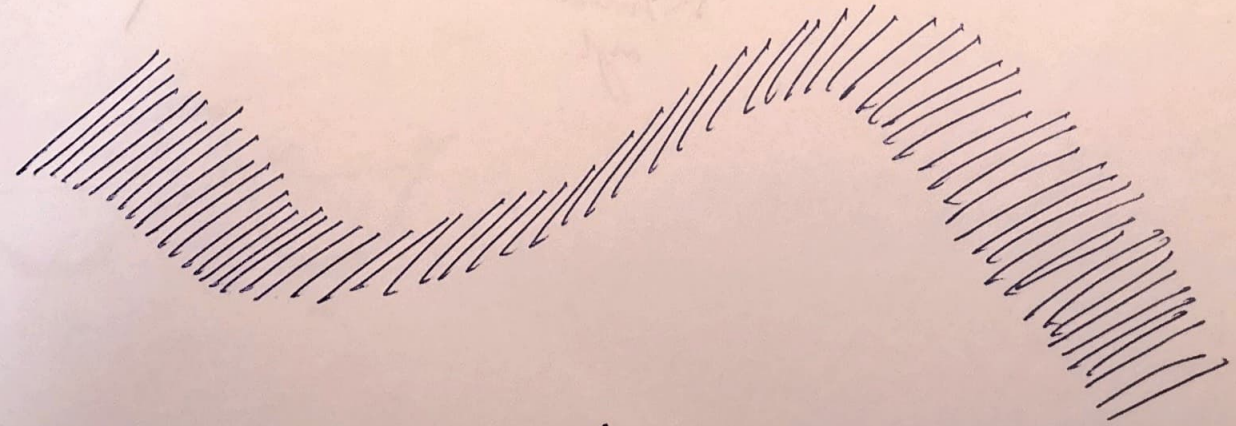


Fold Axis

→ Along a particular section cutting across the fold, the direction the trace of the folded surface appears as a straight line, while in all other section the trace appears as a curved line - this particular direction is known as fold axis.

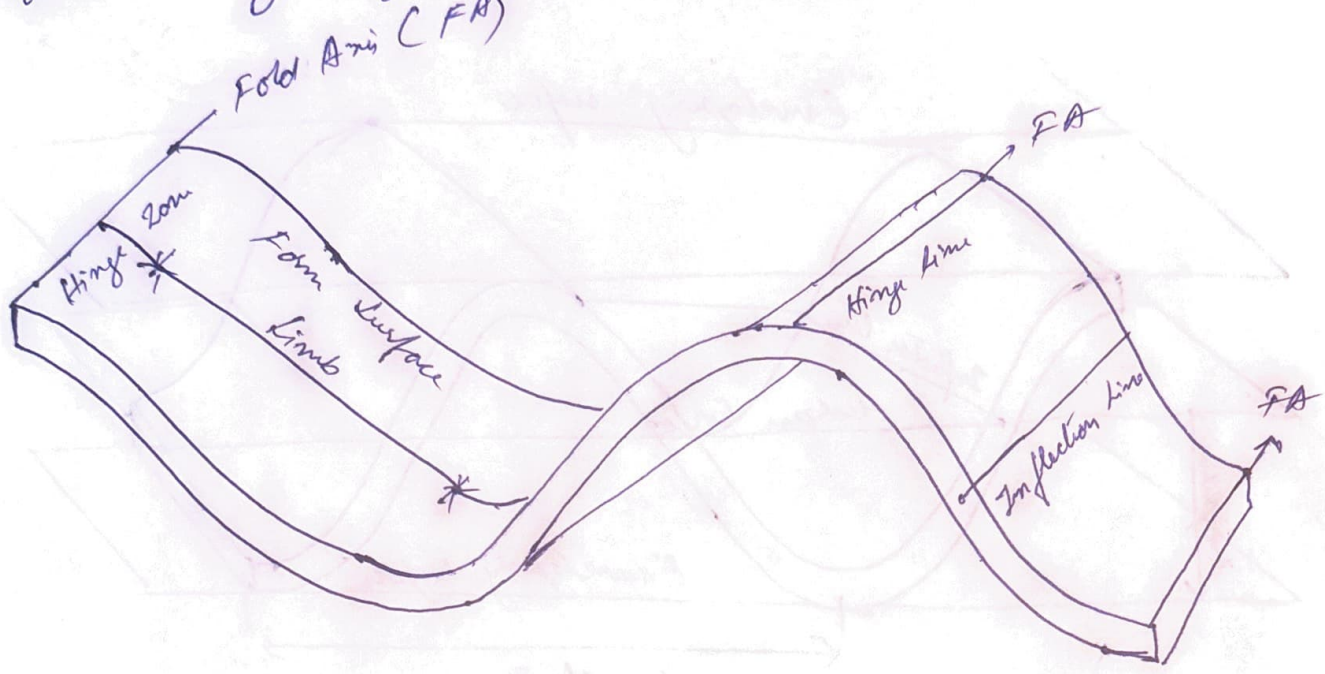


→ A fold axis is a line which, moving parallel to itself generates the folded surface



→ The fold axis does not have a fixed position in space, it has only a constant orientation throughout a volume of rock within which the fold is cylindrical.

→ The geometry of a cylindrical fold is best described by orientation of fold axis along with a description of the section perpendicular to the fold axis. This plane is called a Transverse profile or simply profile.



Enveloping surface, Median surface, Amplitude and wavelength

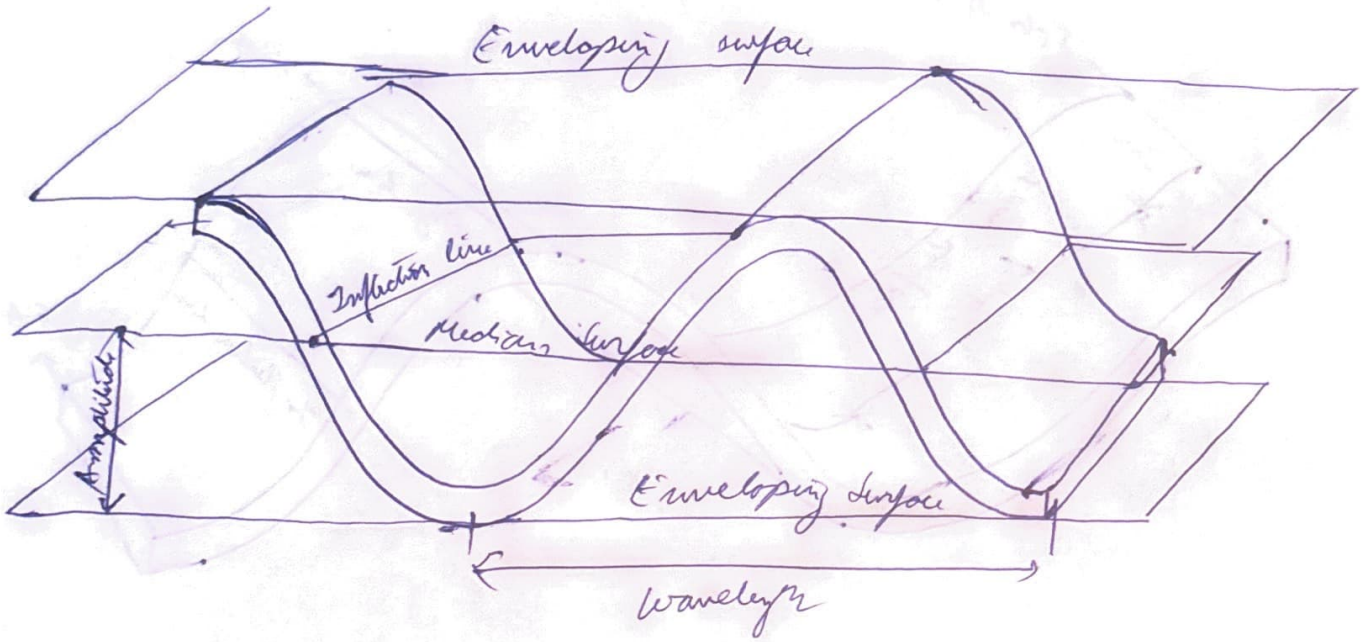
→ The Enveloping surfaces are the two surfaces (not necessarily parallel to each other) that bound the fold train developed in a single folded surface

→ The Median surface includes and connects all the inflection lines of a fold train in a single surface

→ The Amplitude of any fold is the distance from the median surface to either of the enveloping surfaces measured parallel to the axial surface.

→ The wavelength is the distance measured parallel to the median surface, b/w one point of a fold and the geometrically point on a neighbouring fold in the same fold train. For example the distance from one

antiformal hinge to the next antiformal hinge hinge.



Axial surface and Trace of Axial surface

→ The surface joining all hinge lines in a particular nested set of fold is generally known as Axial surface (Hinge surface or Axial planes)

→ The intersection of the Axial surface with the form surface (intersection lineation) is known as Axial surface Trace. and generally indicate the fold axis of the associated fold.

→ The Axial surface trace can be seen on any other surface (exposure, outcrop, topography) other than the form surface and they are not at all defining the fold axis.