**University of Anbar**

**College of Science**

**Department of Applied Geology**

# Structural Geology

**Title of the lecture**

# Mechanism of Folding

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# MECHANISM OF FOLDING

## Introduction

Folds are the most commonly occurring structure in the earth's crust. This fold is the one of the best markers to know the deformation of particular rock mass or landform in geological past. They Occurs in micro, meso and macro scale. Their geometry and style of folding gives idea about type of deformation. They are also important by economically for oil traps, searching ore and mineral exploration. Why folds are generated and how they evolve in the rock mass such. To know about the folds, we need to do field observation. From this study we can know the folding history which helpful to understand the mechanism. Mechanism is the process by which different types of folds are generated.

## Folding mechanisms

There are many types of folding mechanisms.

1. **Bending**

Bending involves forces applied and acting at high angles to layers that may or may not have competence contrasts. A layer subjected to bending is like a notebook supported at the ends and loaded in the middle. The notebook bends downward when the load is placed in the middle Figure 1.

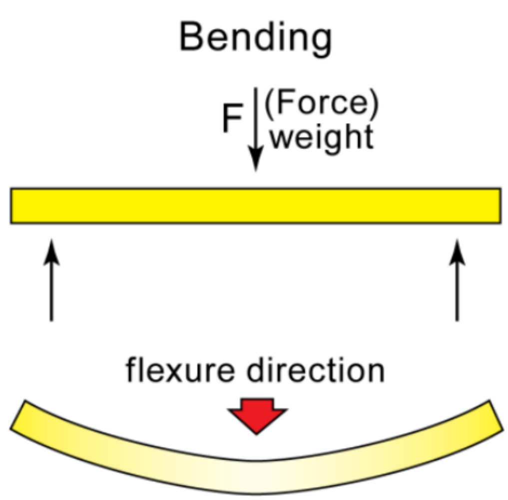


Figure 1. Folding mechanism by bending.

2. **Buckling**

Buckling is a well-known active mechanism for the development of rounded folds in a competent layer (i.e., a layer with low rate of ductile flow) enclosed in an incompetent (with high rate of ductile flow) medium of sufficient viscosity contrast. Gently pushing the two extremities of a paper sheet on a table towards each other reproduces this folding mechanism. When the force is small the sheet remains flat. As the force is slowly increased, it suddenly becomes curved. This rapid change from a flat to a curved (buckled) form at a particular force is due to the development of a mechanical instability.

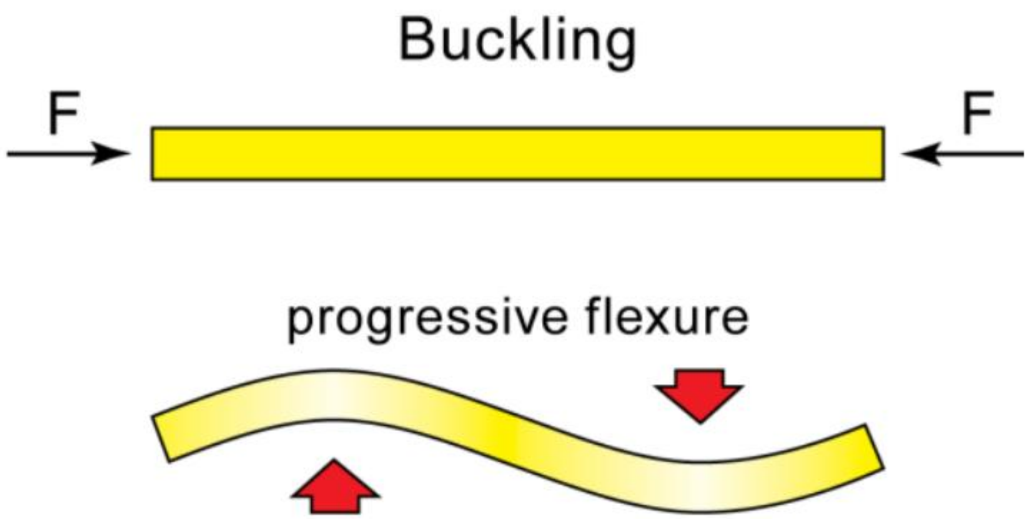


Figure 2 Folding mechanism by buckling

**Flexural-slip and flexural flow:**

A multilayer can be a pile of competent layers separated by surfaces of discontinuity or alternating layers of highly contrasting competence. The mechanical consequence is that the competent layers on either side of the surface of discontinuity or of a weak layer may easily slide relative to each other. This shear "decoupling" of layers allows a fold to accommodate a greater flexure than if the stack deforms as a single layer.

3. **Flexural-slip mechanism**

describes discrete faulting, usually coincident with bedding planes and accompanying folding. A classical simulation is to bend a book or pile of paper sheets; increasing bending about the fold axis is accommodated by increasing slip between the pages of the book or sheets of the pile. The thickness of individual sheets does not change, meaning that each sheet makes a parallel fold (i.e. layer surfaces remain parallel). Slip is an important part of folding because layer-parallel stresses increase with increasing rotation of the limbs Fig. 2.

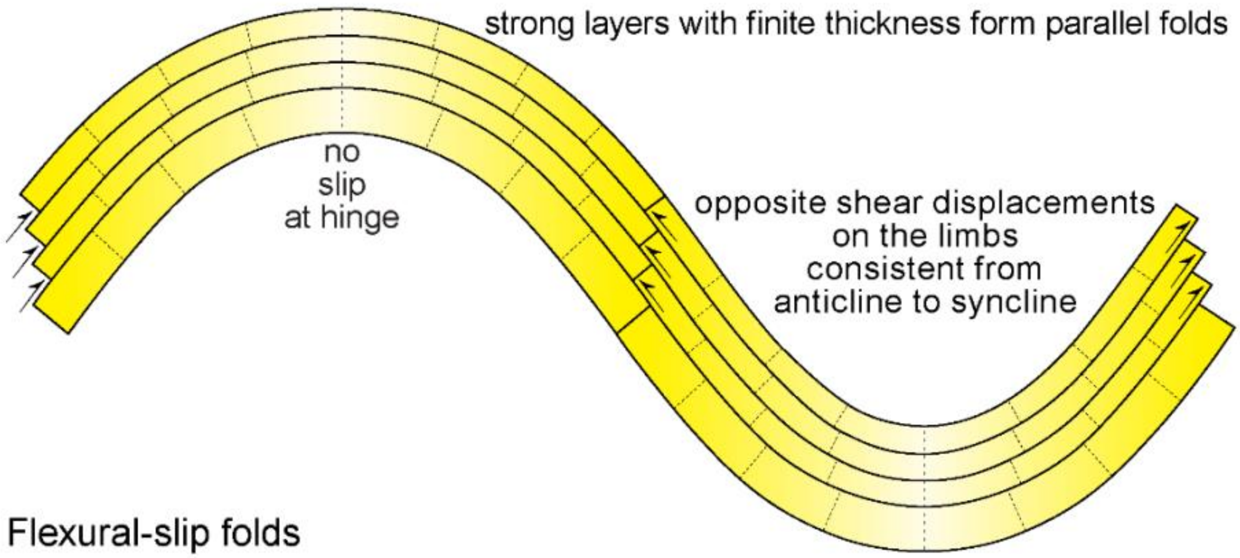


Figure 3 Folding mechanism by flexural slip

4. **Flexural flow mechanism**

describes bedding-parallel shear homogeneously distributed within the ductile layer being folded between stiffer layers. Like for flexural slip, bedding-parallel shear in limbs is opposite across the axial plane. The strain pattern due to hingeward shear tends to develop thickened hinges between thinned limbs, i.e., flexural-flow folds are mostly similar. Flexural-flow is sometimes applied to the weak layers that take up bedding-parallel motion within larger parallel folds. In this case, the stiff, active layers tend to keep their thickness throughout the deformation to produce and control the overall shape of concentric and/or parallel folds while the incompetent layers undergo flexural flow. In order to maintain similarity from bed to bed, ductile material moves out of the limbs into the hinges.

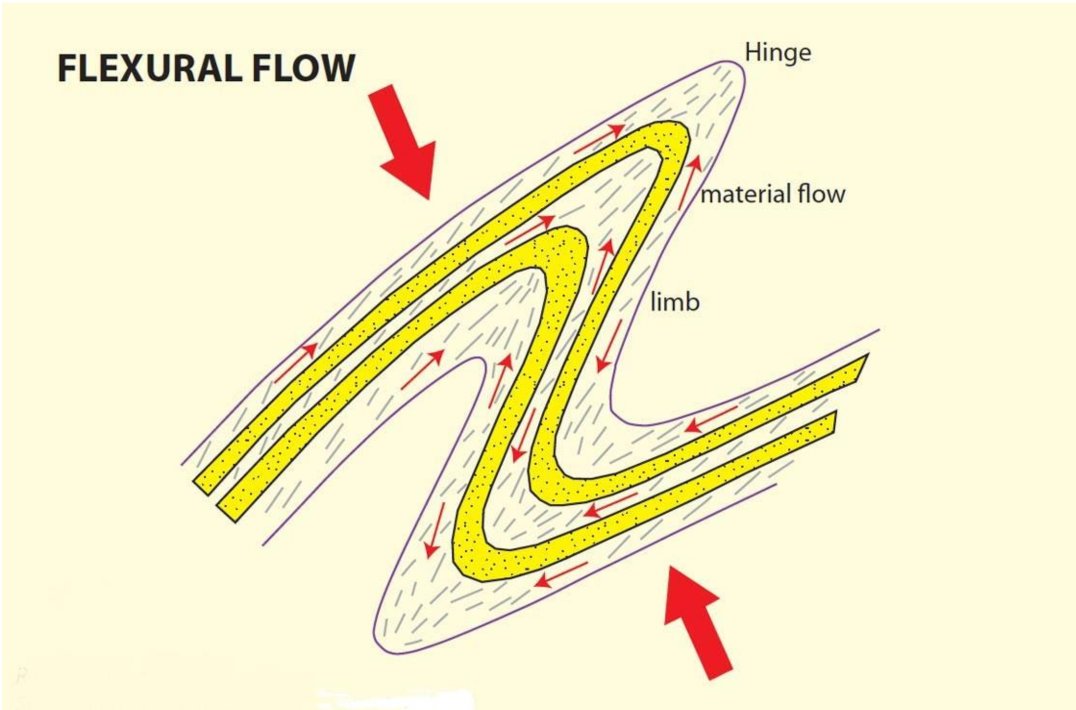


Figure 4 Folding mechanism by flexural flow

## References

Pollard D.D. & Fletcher R.C. - 2005. Fundamentals of structural geology. Cambridge University Press, Cambridge, 500 p.