THE FOLDS OF A SINGLE VISCOSE LAYER: THE METHOD FOR SHORTENING MEASUREMENT IN MODELS AND NATURE (THE GREATER CAUCASUS)

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The folds of single viscose layers take a place usually in flyshoid sequences of rocks in those cases when a competent component of sequence has a thickness much lesser then incompetent one. It may be sandstone or limestone layers inside of a cleavaged argillite. The similar folds may be formed by a venus which is much more competent than rocks of frame (ptygmatic folds). The main feature of this type of folds is fast decreasing of backling deformation into incompetent rocks. Formation of such folds include three mechanisms, namely backling, homogeneous shortening and shearing along fold axial surface. Its combinations produce a shape of folds. The shortening of folds may be defined only at the same time as combination of mechanisms. The model of similar fold shape development by Hadleston and Stephansson [1973] was used as basis of method. The drawn shape of folds with various viscous contrast (1:10, 1:100, 1:1000) was fixing by a system of measurement [Yakovlev, 1978]. There were length (Lf) of flank (as length of line between top of layer in anticline and bottom of layer in syncline), fold angle (Af) as angle between two of these lines along flanks, thickness of layer in hinge (Th), thickness of layer in flank (Tf). Two diagrams were drawing up after measurements in model. The ordinate is the fold angle (Af) measurements for both diagrams. The abscissas are ratio of Lf to Th for the first (1) diagram and ratio of Lf to Tf for the second (2) diagram. The net of two signs' curves (shortening Sh and viscose contrast Vc) was drawing up on base of these famous points by interpolation and extrapolation. These two diagrams are correct for the combination of two mechanisms - backling and homogeneous shortening. If any part of third mechanism took place, the positions of measured point inside net on two diagrams are not the same. For the correction of such measurement it is necessary to use the third diagram (3). The net of shortening and viscous contrast is showing and two families of curves for changing of fold shape due to shearing mechanism were plotted. Two lines from points must be draw along family of curves and a cross of these lines (thick for data from diagram 1) gives point with correct data of shortening and viscose contrast.

The method was applied for study of experiment F14 by Dixon and Tirrul [1991]. Three parts of sequence were deformed and more competent middle part formed folds of single viscous layer. The veritable data and obtained once were 0.8-0.82, 0.72-0.64, 0.68-0.56, 0.62-0.48. This test shows a good result because the outside matter has not enough thickness.

More than 70 series of folds was studied at the Chiaur flysh synclinorium in the Greater Caucasus. The average shortening has value nearly 0.4-0.5 and deviates from 0.18 to 0.75. The viscous contrast for sandstone and argillite has estimates 8 - 10 and deviates from 2 to 15 (20 - 60 for quarts-calcite veins). The influence of shearing mechanism as usual is not more than 0.05 -0.1 of shortening. Agreement between the data and real folding structure of zone is quite reasonable.