

## **RHEOLOGY GAUGE IN PINCH-AND-SWELL BOUDINAGE**

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The method estimating rheological behavior of rocks from structural features or strain patterns is called structural rheology gauge or simply rheology gauge. Previous studies by many authors have show that the pinch-and-swell boudinage contains rheological information of the rocks during deformation. However, quantitative techniques for estimation of the rheological properties have not found yet. In this paper, the authors develop a quantitative method to estimate the rheological parameters from the geometric characteristics of natural pinch-and-swell structures. Under certain assumption, we can solute the stress exponent by use of a difference equation relating the original and deformation thickness of the competent layer, the initial perturbation in the layer thickness and the stress exponent of the layer. Then, we can obtain the viscosity ratio of the competent layer to its matrix using the unified nonlinear theory for fold and pinch-and swell boudinage relating the dominant wavelength, the viscosity ratio of the layer to its matrix, the stress exponents of the matrix and the layer, We applied this rheology gauge to Xishan, Beijing and gained the stress exponents of calcite quartz vein embedded in marble, quartz vein in slate, and striped silicalite in dolomite. They range from 3.61 to 7.69, 2.51 to 4.75, and 2.25 to 3.93, respectively. The results are consistent with the lab results of most rocks in crystal plastic deformation mechanism.