

Brittle Deformation of the Ernstbrunn Limestone (Jurassic) of the Pavlov Hills

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The Ernstbrunn Limestone is suitable for the study of the mechanics of brittle deformation. It represents the top member of the carbonate facies of the Klippen Belt (Eliáš 1961, Matějka *et al.* 1961) of the Upper Jurassic (Oxfordian) to Lower Cretaceous (Hauterivian) age (Eliáš 1992). It is crosscut by a set of faults of mainly W-E to SW-NE direction. The faults divide the limestone body into several morphological blocks. Inverse stress analysis indicates presence of several phases of the fault development. The older faults are characterized by up to several decimeters wide striae on their surfaces. The younger striae are finely spaced and oblique. It was possible delimited up to 5 different striae on one fault plane.

Samples of the Ernstbrunn Limestones from the Mikulov surroundings were mechanically tested using testing machine ZD10/90 VEB-TIR Rauenstein (DDR). The tested bodies were 9 cm high with cross-sectional area 5x5 cm. The averaged rock strength under axial loading is 162,1 MPa with coefficient of internal friction 65,2°. The density of the rock is 2,65 g/cm³.

The late tectonic deformation (loading) was studied by the finite element method (FEM) using PC program Plaxis 7.0. The cross-section of area was substituted by the bounded set of the elementary triangles (Fig. 1) and whole deformation matrix was got at the end. Obtained data can be visualized as decomposed stress (Fig. 2) or as principal stress orientation (Fig. 3). The subvertical loading after thrusting the limestone over soft bedrock yields to special strain effect (Fig. 4) and the old inverse fault planes could be reactivated in normal sense of shear, what is in agreement with the observed movements on the fault planes in the field.

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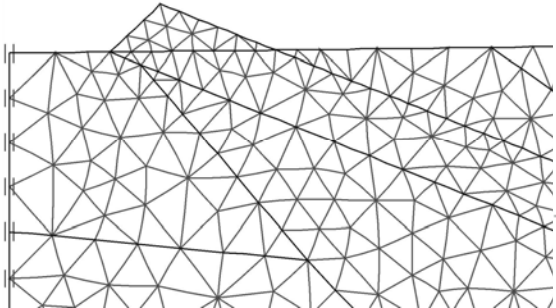


Fig. 1 - Primary triangles construction

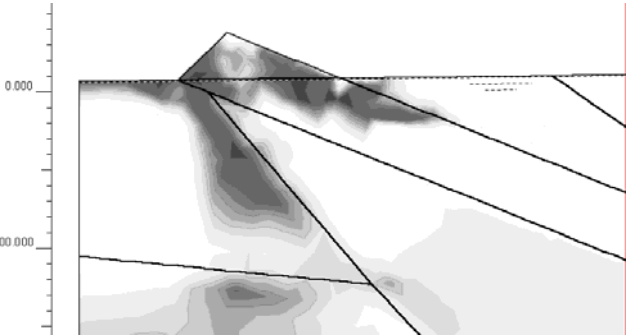


Fig. 2 - Decomposition of stress

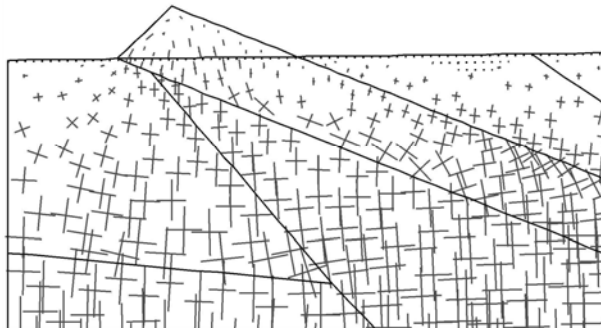


Fig. 3 - Principal stress orientation rocks

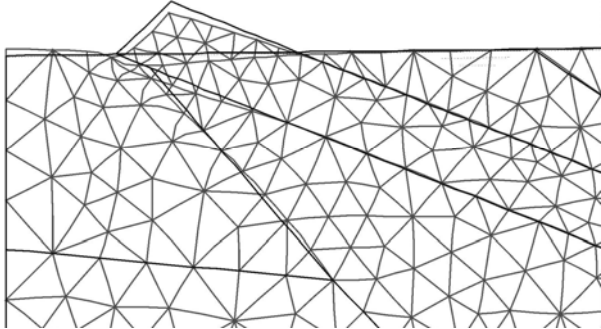


Fig. 4 - Influence of rigid limestone desk on soft rocks