Improved deformation mechanism of masonry vault.

Kaspars Bondars[1], Aleksandrs Korjakins[1]
[1]*Faculty of Building and Civil Engineering, Riga Technical University, Riga, Kalku str. 1 LV-1658, Latvia*

The foundation settlement affect is the reason of shell part disintegration and hinge forming in main supporting ribs in the heritage's vaulted structure. The most theories consider masonry as interacting parts of rigid body. Simulation of hinge mechanism between two rotating masonry parts is performed in the present investigation. Taking into account elasticity of brick and plasticity deformations of mortar at the contact surface the scaled test and numerical investigation are accomplished. Crack propagation in arch cross section is considered as result of hinge rotation, and defines thrust line position and rotation point in cross section. Cyclic crack opening and contact between surfaces of masonry parts allow making assumption about fail of the tensile stresses in interacting parts. The deformed state model of Dom Cathedral's vault has been created using improved rotation mechanism of masonry rib parts and measurement of cracks opening. Deformed state model and long term crack monitoring will be used for analysis of influence the support deformations. Analysis of information obtained from long term monitoring of cracks, initiated by settlement progress, gives possibility to evaluate a stress-strain state of masonry vault and choose the best method for foundation reconstruction.