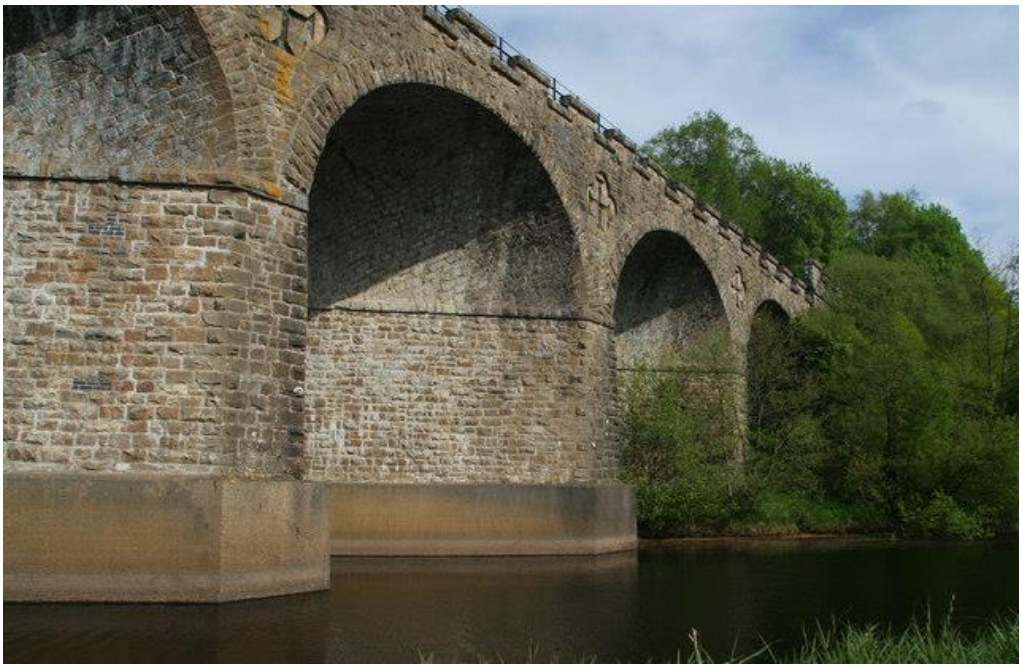
MŰEGYETEM 1782

# Discrete element analysis of skewed masonry arches

Student Scientific Work



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## Abstract

Masonry arch bridges are inherent elements of Europe's transportation system. Many of these bridges have spans with a varying amount of skew. Most of them are well over 100 years old and are supporting traffic loads many times above those originally designed, but the increasing traffic loads may endanger their structural integrity so the need arises to understand the mechanical behaviour in order to inform repair and strengthening options.

There are three main construction methods mostly used in such bridges. The differences in geometry lead to differences in strength and stiffness.

The study to be presented investigates the mechanical behaviour of single span masonry arches. The analysed construction methods were the so-called false skew arch, the helicoidal and the logarithmic method. The three-dimensional computational software 3DEC based on the discrete element method was used: this software allows for the simulation of frictional sliding and separation of neighbouring stone blocks. The behaviour of the structures was simulated under gravity. Types of failure modes, stress levels, shear displacements at the joints will be compared and discussed in the presentation. The minimum necessary thickness which can resist the self-weight was also determined.

**KEYWORDS:** skew arch, stereotomy, 3DEC

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