The dome of the Royal Museum for Central Africa: Construction of a tile dome and its graphical static analysis

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Abstract

The central dome of the Royal Museum for Central Africa in Tervuren (Belgium), was completed in 1906. The architect of the building, Charles Girault, designed a double brick dome with a pointed profile and a span of approximately 20 m. It features an oculus at its center. Documentation held in the Museum's archives provides detailed information about its construction. The first layer of both shells consists of hollow bricks laid flat, working as a centering for several layers of solid bricks. The shells of the dome have varying thickness, and twelve ribs connect both shells at the lower part of the dome, where several mild steel ties absorb tensile stresses. Among the construction drawings, a graphic static analysis, signed by the architect in 1905, is preserved. This article examines the graphic method used to analyze the dome and explains the state of the art at the time of this analysis, when several publications were addressing similar problems. The matter has not only historic interest. The equilibrium analysis is completely correct within the frame of modern limit analysis of masonry and the paper shows that it is possible to analyze complex domes with this approach.

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