Ordinary analysis of concrete porticoes: a modification of Cholesky’s method for graphically solving their equation systems

Agustin G. LACORT

Higher Technical School of Architecture, University of the Basque Country
Plaza de Oñati, 2, 20018, Donostia-San Sebastián (SPAIN)
agustingregorio.lacort@ehu.eus

Abstract

The present study suggests an accurate, graphic procedure for solving equation systems derived from conventional equilibrium analyses of linear building structures. The procedure comes from a change in method [1] when concrete porticoes are analysed. It is based on the establishment of a link between the operations that factorise the stiffness matrix and the mechanical behaviour of the portico. This link was detected on observing that Cholesky’s operations explain the process of equilibrium when the portico cracks progressively. If these cracks are not taken into account, factorisation becomes simpler and coincide with the Crout’s one. Its operations are suggested to carry out graphically using the simple mnemonic rules that make up the new procedure (Fig.1). The accuracy of the results is similar to that obtained with [1] & [2] when the sketches are drawn freehand in all cases, which facilitates the use of the procedure in the early stages of design. In the course of the exposition the method is justified qualitatively by using Cross’s philosophy, the mnemonics are set out and the deflection of a model is obtained graphically. Based on this work, possible lines of research are pointed to for developing further graphic methods that can be used to analyse other types of structure accurately.

Figure 1. Analyzing a model freehand

References
