Numerical model for posttensioning concrete structures

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SUMMARY

This work presents a numerical model developed for the computations of posttensioned plane structures. The prestressed cables and the reinforcement are modelled using one-dimensional curvilinear elements; thus, they can be determined independently of the two-dimensional finite element mesh and can occupy a general position. Among the losses which influence the decrease in the prestress force, it is possible to compute the losses caused by friction between cables and the concrete, the losses which result from the concrete deformation and the losses in the anchorage zone. The computation for posttensioning structures is organized in phases. In the phase which precedes the prestressing of the cables the structure is computed taking into account the dead load and one part of the permanent load. In the prestressing phase the cables are tensioned individually. The prestress force can be applied at once or incrementally. In the third phase, which follows the tensioning of all cables, the structure is computed taking into account the remaining part of the dead load and the live load. The developed model was tested on a few examples.