The Theoretical Study of the Beams Supported on a Straining Environment as an Interaction Problem Soil - Structure - Infrastructure Interaction

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Tomme: LII (LVI) | **Fascicle:** 3-4 | 2006
Pages: 109-120

Abstract text:

Between structure, infrastructure (foundation) and soil there is an effective interaction, which has to be taken into account as correctly as possible every time we do the calculation. This effective interaction can be analysed in a global form, considering on one hand the entire building, and on the other hand the soil -- establishment surface, or in an analytical form: we consider first the soil -- infrastructure (foundation) interaction and then the structure -- infrastructure one. Without considering the interaction, we cannot make neither the calculation (for the soil) according to the limiting deformation state which has to be compatible with the structure's resistance system, nor calculation for the limiting resistance state, because the correct distribution of efforts along the contact surface between the soil and the structure is unknown, so we cannot determine the zones of plastical equilibrium in the soil massive and the conditions of limited equilibrium. Also, without considering the infrastructure, we cannot correctly calculate the efforts and the deformations which may occur in all resistance elements of the building. Therefore, we cannot talk about limiting state calculation without considering the interaction between the soil and the structure itself. The problem of interaction between building, on one hand and soil foundation, on the other hand, is not approached very much in the specialized literature, because of the big difficulties raised by summarizing all the factors that describe the structure and the environment, which would be more accessible to a practical calculation. A lot of buildings or elements of buildings standing on the soil or on another environment with finite rigidity can be taken into account as beams supported on a straining environment, (continuous foundations, resistance walls, longitudinal and transversal membranes of civil and industrial buildings, hydrotechnic works). Therefore, in the present paper we shall analyse the problems regarding the calculation of some types of beams supported on a straining environment (foundation soil). In general, we shall use the term "beams supported on a straining environment" and not "beams supported on an elastic environment" because the foundation soil, which is in fact the supporting environment most commonly met in practice, cannot be considered as a perfectly elastic, homogeneous and isotropic environment, and it can be at most simplified in calculation as a linear or not linear environment.

Key Words:

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