

INTERPRETATION OF RECOVERY TESTS IN FRACTURED AND KARSTIFIED LIMESTONE IN NORTHWEST VIETNAM

Vu Thanh TAM¹, Florimond DE SMEDT², Okke BATELAAN² and Alain DASSARGUES^{3,4}

¹ *Research Institute of Geology and Mineral Resources, Ministry of Natural Resources and Environment, Km 9 Nguyen Trai Street, Thanh Xuan, Hanoi, Vietnam*
vttam@pmail.vnn.vn

² *Department of Hydrology and Hydraulic Engineering, Vrije Universiteit Brussel, Pleinlaan 2, B-1050 Brussels, Belgium*

³ *Département Géoresources, Géotechnologies et Matériaux de Construction (GEOMAC), Université de Liège, B.52 Sart-Tilman, B-4000 Liege, Belgium*

⁴ *Hydrogeology and Engineering Geology, Department of Geography-Geology, K.U. Leuven, Redingenstraat 16, 3000 Leuven, Belgium*

Keywords: Vietnam, carbonate rocks, pumping test, recovery test.

This paper presents an application of the double-porosity concept and the Cooper-Jacob straight-line approximation in an interpretation and analysis of recovery tests in fractured and karstified limestone in NW Vietnam. Based on the occurrence of two parallel straight lines in semi-log plots of drawdown vs. pumping time and residual drawdown vs. recovery time, a method was developed to calculate hydraulic properties of the fractures and the matrix blocks. Early-time drawdown is related to a water release from fracture storage while late-time drawdown as a consequence of a release from both fractures and matrix blocks. Both

media share a conductive property of the fractures. The drawdowns of early- and late times are described by the well-known Theis well flow equation, and under appropriate conditions can be approximated by the Cooper-Jacob approximation, resulting respectively two parallel straight lines. Relevant equations are derived for residual drawdown on the basis of the principle of superposition, which facilitate a curve-matching method to calculate principal aquifer characteristics, such as recovery transmissivity and storativity.