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Standard Guide for Selecting a Groundwater Modeling Code[1]

This standard is issued under the fixed designation D6170; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This guide covers a systematic approach to the determination of the requirements for and the selection of computer codes used in a groundwater modeling project. Due to the complex nature of fluid flow and biotic and chemical transport in the subsurface, many different groundwater modeling codes exist, each having specific capabilities and limitations. Furthermore, a wide variety of situations may be encountered in projects where groundwater models are used. Determining the most appropriate code for a particular application requires a thorough analysis of the problem at hand and the required and available resources, as well as detailed description of the functionality of candidate codes.

1.2 The code selection process described in this guide consists of systematic analysis of project requirements and careful evaluation of the match between project needs and the capabilities of candidate codes. Insufficiently documented capabilities of candidate codes may require additional analysis of code functionality as part of the code selection process. Fig. 1 is provided to assist with the determination of project needs in terms of code capabilities, and, if necessary, to determine code capabilities.

1.3 This guide is one of a series of guides on groundwater modeling codes and their applications, such as Guides D5447, D5490, D5609, D5610, D5611, D5718, and D6025.

1.4 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This guide cannot replace education or experience and should be used in conjunction with professional judgement. Not all aspects of this guide may be applicable in all circumstances. This guide is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this guide be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D5447 Guide for Application of a Groundwater Flow Model to a Site-Specific Problem

D5490 Guide for Comparing Groundwater Flow Model Simulations to Site-Specific Information

D5609 Guide for Defining Boundary Conditions in Groundwater Flow Modeling

D5610 Guide for Defining Initial Conditions in Groundwater Flow Modeling

D5611 Guide for Conducting a Sensitivity Analysis for a Groundwater Flow Model Application

D5718 Guide for Documenting a Groundwater Flow Model Application

D6025 Guide for Developing and Evaluating Groundwater Modeling Codes (Withdrawn 2017)[3]

3. Terminology

3.1 For definitions of other terms used in this guide, see Terminology D653.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *analytical model—in groundwater modeling*, a model that uses closed form solutions to the governing equations applicable to groundwater flow and transport processes.

3.2.2 *code selection*—the process of choosing the appropriate computer code, algorithm, or other analysis technique capable of simulating those characteristics of the physical system to fulfill the modeling project's objective(s).

[1] This guide is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.21 on Groundwater and Vadose Zone Investigations.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The last approved version of this historical standard is referenced on www.astm.org.

*A Summary of Changes section appears at the end of this standard

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