

Formation en modélisation hydrogéologique

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Une méthodologie complète pour la modélisation des écoulements souterrains est décrite étape par étape. Des définitions, une terminologie et une méthodologie générale sont proposées. L'accent est mis sur les choix à faire lors de l'élaboration des modèles conceptuels impliquant les processus à simuler, les problèmes d'échelles, la dimensionnalité, la parcimonie par rapport à la complexité. La conception du modèle et l'entrée des données sont abordées avec une description des différentes données d'entrée. La calibration, la validation, l'analyse de sensibilité et la modélisation inverse sont résumés.

Un rappel des concepts et équations de base de l'écoulement des eaux souterraines en zone saturée en régime permanent et transitoire est suivi par la description des différents conditions aux limites.

La méthode des différences finies est présentée en détail et sur des cas conceptuels simples afin de garder la description mathématique relativement simple. Les schémas d'intégration temporelle explicites, implicites, Crank-Nicolson et Galerkin sont décrits. Des recommandations utiles sont données au praticien en termes de discrétisation spatiale et temporelle et d'autres choix conceptuels.

La longue liste de référence est fournie afin de permettre aux professionnels d'approfondir le sujet. Spécifiquement pour la discussion sur les conditions aux frontières, de nombreuses références de l'auteur et de son équipe de recherche sont fournies pour permettre de trouver des exemples pratiques de choix de ces conditions dans divers cas pratiques.

Key words

Modèle déterministe, modèle stochastique, modèle probabiliste, modèle conceptuel, processus couplés, parcimonie, complexité, dimensionnalité, conditions limites, conditions initiales, conception du modèle, facteurs de stress, données historiques, calibration, validation, fonction objectif, critères de performance, analyse de sensibilité, modélisation inverse, incertitude des prédictions, simulations de Monte Carlo, écoulement, équations, conditions aux limites, méthode des différences finies, schéma d'intégration temporelle, intégration temporelle explicite, intégration temporelle implicite, schéma de Crank-Nicolson, schéma de Galerkin, critère de stabilité.

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