lgciv2054
2019

Numerical simulation of transient flows

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

4 credits	20.0 h + 15.0 h	Q1

Teacher(s)	Soares Frazao Sandra ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	Mathematical models and numerical resolution of transient flows in contexts such as: • Water distribution networks • Open-channel flows • Natural rivers with morphological evolution
Aims	**Contribution of the course to the program objectives (N°)** AA1.1, AA1.2, AA2.1, AA2.2, AA2.3, AA2.4, AA2.5, AA3.1, AA3.2, AA3.3, AA4.2, AA4.4, AA5.2, AA5.3, AA5.6 **Specific learning outcomes of the course** 1 More precisely, at the end of the course, the student will be able to : • Calculate water hammers in a pipe network • Calculate transient flows in rivers • Evaluate the consequent morphological evolution - - - - *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*

Content	1. Transient flows in pressurized pipe networks :
	
	• Water hammer : rigid column theory
	• Pressure waves
	
	2. Free-surface transient flows
	
	• One-dimensional flows
	  - Saint-venant equations, solutions by the method of characteristics
	  - Wave speed analysis
	  - Positive and negative waves
	• Two-dimensional flow equations
	• Numerical methods
	  - Finite-differences : Harten, Mac Cormack
	  - Finite-volume and shock-capturing methods
	  - Application : dam-break flow
	
	3. Morphological evolution in rivers
	
	• Numerical models (finite-differences, finite-volumes)
	• Non-equilibrium sediment transport
	• Applications : dam-break flows over mobile beds

Faculty or entity in charge	GC

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Civil Engineering	GCE2M	4		🔍