

Tárgytematika / Course Description

Data assimilation

GKNM_MSTA048

Tárgyfelelős neve /

Teacher's name: dr. Harmati István

Félév / Semester: 2022/23/1

Beszámolási forma /

Assesment: Vizsga

Tárgy heti óraszám /

Teaching hours(week): 2/2/0

Tárgy féléves óraszám /

Teaching hours(sem.): 0/0/0

OKTATÁS CÉLJA / AIM OF THE COURSE

The course introduces the basic methods of data assimilation and their mathematical background with emphasis on applications.

TANTÁRGY TARTALMA / DESCRIPTION

Basics of probability, random variables, conditional and marginal distributions. Basics of statistics and estimation theory. Bayesian estimation.

Dynamical systems, iterations, differential equations, long-term behaviour. Controlled dynamical systems. Probabilistic view of dynamical systems, ergodicity.

Basic notions, properties and categories of stochastic processes. Correlation measures. Smoothing problems, filtering problems. Linear Gaussian problems. Kalman smoother. Particle filter. Kalman filter, extended Kalman filter. Ensemble Kalman filter. Markov Chain Monte Carlo methodology: deterministic

and stochastic dynamics. Linear smoothers. Variational methods. 3D Var, 4D Var, adjoint method. Large-time behaviour of filters.

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESSMENT'S METHOD

written exam in the exam period

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

Rodolfo Guzzi: Data Assimilation: Mathematical Concepts and Instructive Examples (Springer, 2016, ISBN: 978-3-319-22410-7)