AI/ML Initiative Newsletter - Summer 2021

Mon, Jul 26, 2021 at 9:31 AM

CSDMS
community surface dynamics modeling system

CSDMS AI&ML Focus Group

Co-Chairs Newsletter ***July 2021***

Machine Learning and Delta Subsidence

"Nowcasting Depth Change on the Mississippi River Delta Front"

Jeff Obelcz, US Naval Research Laboratory, Stennis Space Center

Paper at: https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2020GL087857
See the talk at "https://noaabroadcast.adobeconnect.com/p14rt6j4oc9g/"

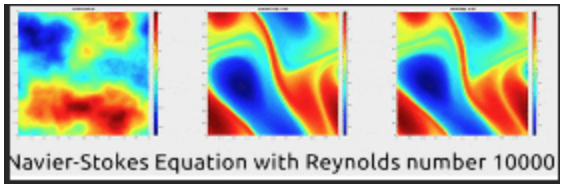
The subaqueous Mississippi River Delta Front is an area of dynamic (> 1 m/year depth change) and heterogeneous morphologic change. Here, we use machine learning algorithms trained and validated on repeat multibeam bathymetric surveys to geospatially predict depth change where it is not directly measured. We demonstrate here that depth change can be robustly estimated on the MRDF using as little as 1% of a full-coverage bathymetric survey, offering a valuable monitoring alternative to expensive and time-consuming full-coverage repeat mapping.

Jeff Obelcz is a marine geologist at the US Naval Research Lab at the Stennis Space Center, MS and a member of the CSDMS AI/ML panel.

AI and Hydrodynamics – some of the news

Hydrodynamics modelling is important in CSDMS. What is happening with AI and ML in this field ?
It's in the news …

Navier Stokes



Neural Network AI methods in Fourier space find PDE solutions to Navier Stokes problems at high Reynolds Numbers.

See: Karen Hao "https://www.technologyreview.com/2020/10/30/1011435/ai-fourier-neural-network-cracks-navier-stokes-and-partial-differential-equations/"

Li, X., et al. 2021. Fourier Neural Operator For Parametric Partial Differential Equations, arXiv:2010.08895v2, https://arxiv.org/pdf/2010.08895.pdf

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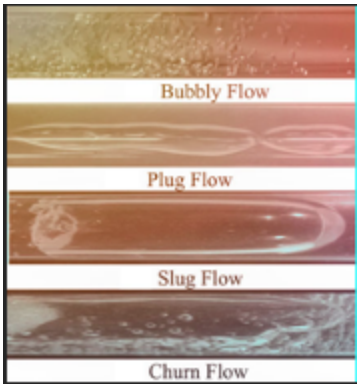
Flow regimes

… "annular flow, bubble flow, churn flow, plug flow, slug flow and stratified flow" …

Support Vector Machine methods in AI identify flow conditions from photographic data.

See "https://blog.isa.org/artificial-intelligence-based-improved-classification-two-phase-flow-patterns"



Credits to: International Society of Automation, Cornell University, MIT Technology Review, and

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