

Controle de Sistemas Mecânicos – COM 878

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Ementa da Disciplina

- Introdução à Teoria de Controle
- Modelagem de sistemas mecânicos
- Retroalimentação e Estabilidade
- Controle Proporcional Derivativo
- Controle Ótimo e Robusto
- Inteligência Artificial e Machine Learning

Bibliografia e Material Didático

- Karl. J. Astrom and Richard Murray. Feedback Systems: An Introduction for Scientists and Engineers. Princeton University Press, 2008. Distribuição livre em :
https://fbswiki.org/wiki/index.php/Main_Page
- . Material didático de apoio:https://murray.cds.caltech.edu/CDS_101/110,_Fall_2015
- Apoio computacional: <https://python-control.readthedocs.io/en/0.10.0/>
- Steven L. Brunton and J. N. Kutz. Data-driven Science and Engineering: Machine Learning, Dynamical Systems, and Control. Cambridge University Press, 2019
- Material didático assíncrono: Steve Brunton : control bootcamp – Youtube.

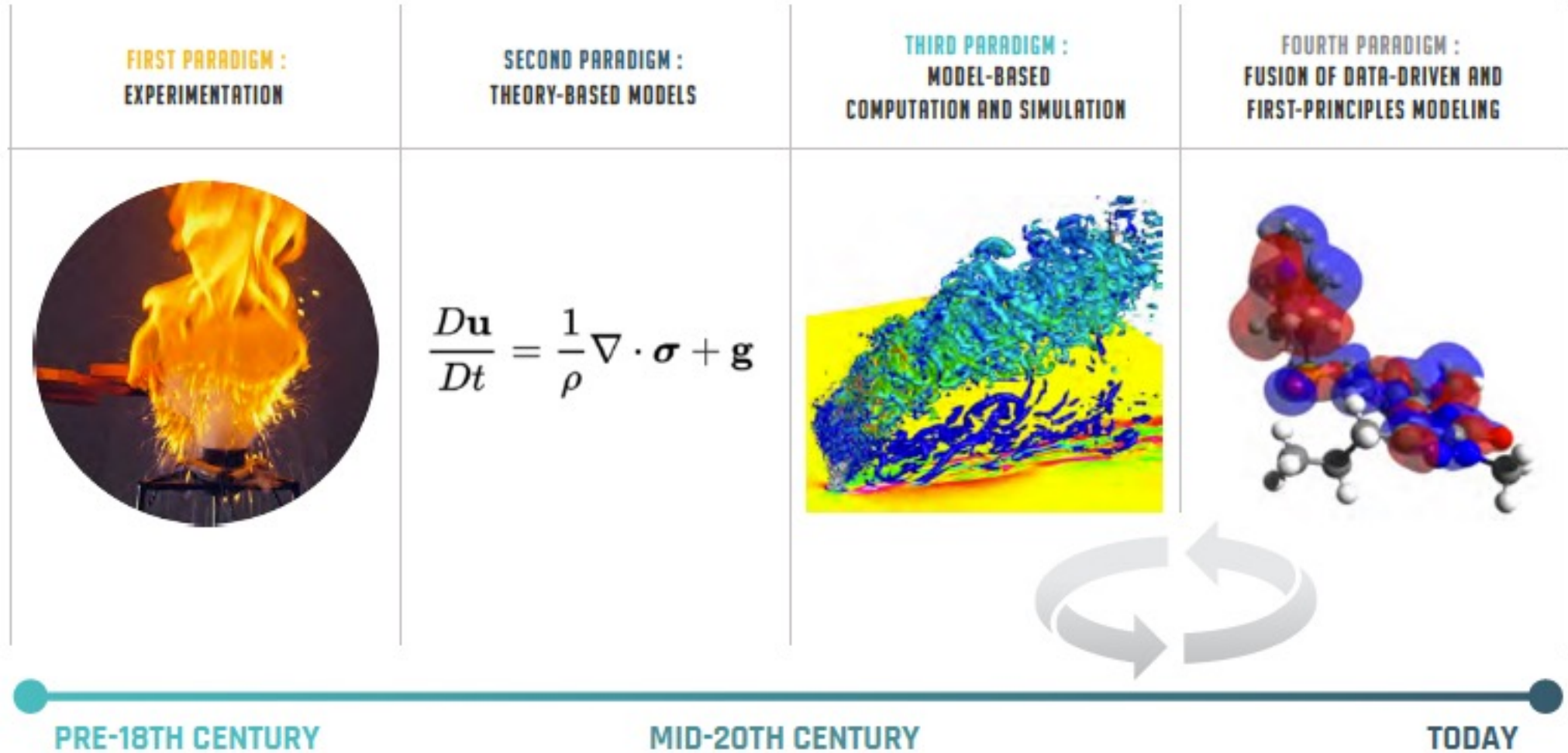
Contexto e Objetivos

What is Artificial Intelligence?

Artificial intelligence (AI) is wide-ranging branch of computer science concerned with building smart machines capable of performing tasks that typically require human intelligence. AI is an interdisciplinary science with multiple approaches, but advancements in [machine learning](#) and deep learning are creating a paradigm shift in virtually every sector of the tech industry.

<https://builtin.com/artificial-intelligence>

COMPUTATIONAL SCIENCE + ENGINEERING PARADIGMS



xPRO

<https://xpro.mit.edu/programs/program-v1:xpro+MIT/>

faculty research and course presentations, 2020.

MIT xPRO, "Machine Learning, Modeling, and Simulation: Engineering Problem-Solving in the Age of AI,"

Um novo paradigma (convergência de tecnologias) Digital Twins

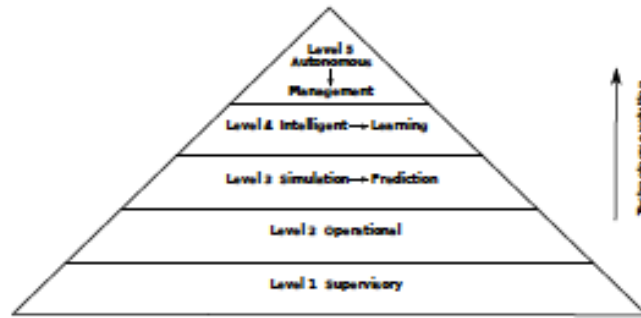
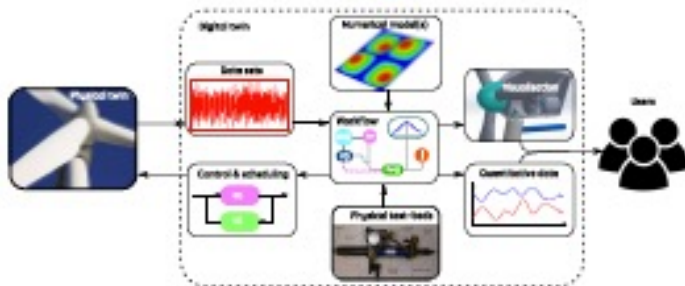
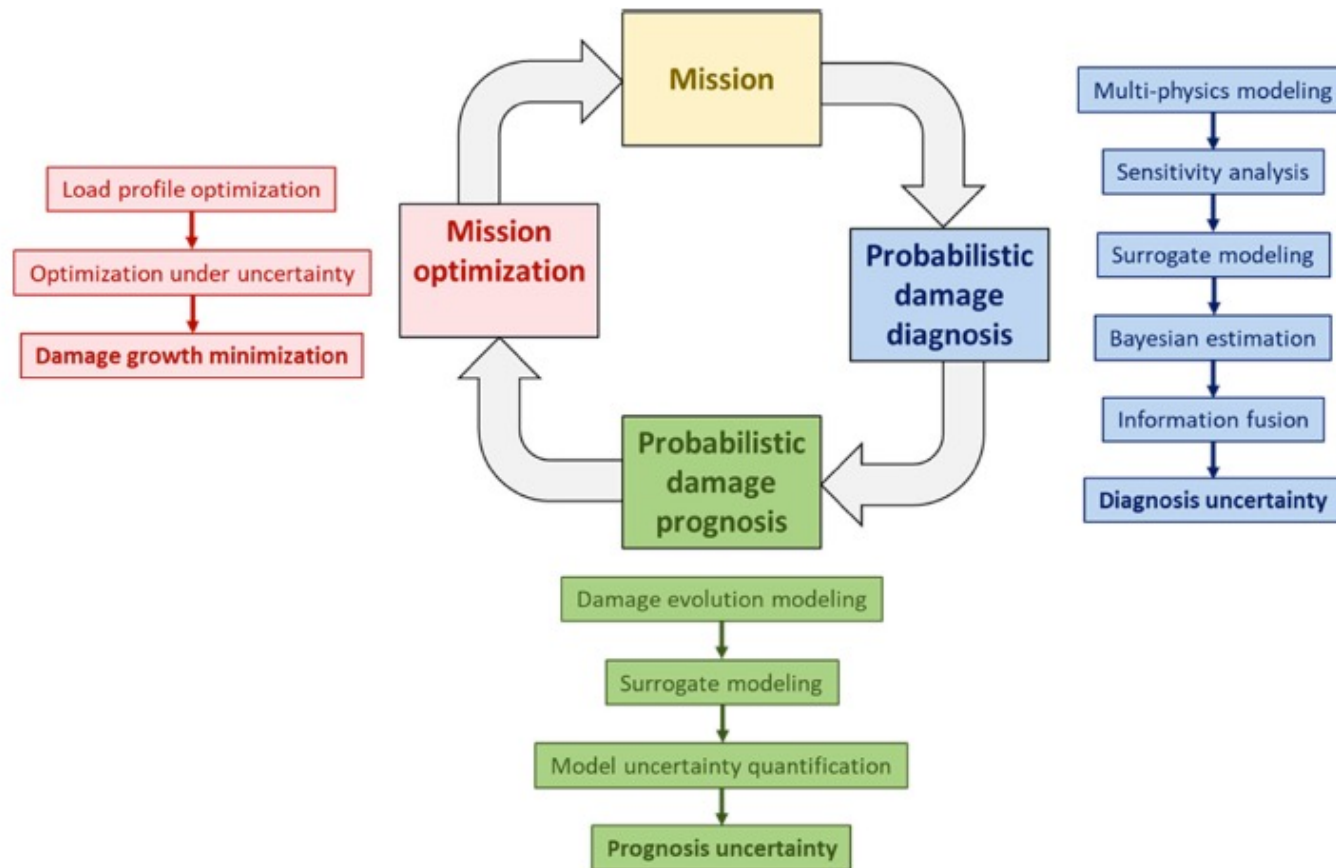


Fig. 1- A capabilities hierarchy for digital twins where each level encompasses all the previous capabilities of the levels

- Digital Twins: State-of-the-Art and Future Directions for Modeling and Simulation in Engineering Dynamics Applications DJ Wagg, K Worden, RJ Barthorpe, P Gardner
- ASCE-ASME J Risk and Uncert in Engrg Sys Part B Mech Engrg 6 (3)



Digital Twin : integração entre modelos baseados na física e machine learning



Digital twin approach for damage-tolerant mission planning under uncertainty

Pranav M. Karve^a, Yulin Guo^a, Berkcan Kapusuzoglu^a, Sankaran Mahadevan^{b,*}, Mulugeta A. Haile^b

**Monitoração da integridade física de sistemas operando em condições extremas:
Diagnóstico – Prognóstico – Tomada de decisões**

Inteligência Artificial...

- Convergência de diferentes tecnologias
- Automação “extrema” – I. 4.0
- Articulando “software” com “hardware”
- Impulsionada por Machine Learning