Smart Structures & Artificial Intelligence

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LABEX CELYA
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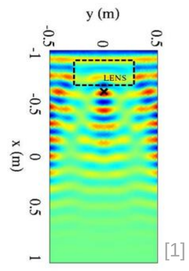
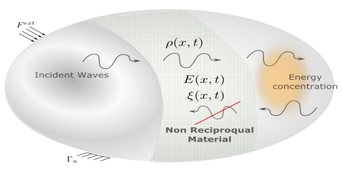
Contexte & Objectifs

Intégration de systèmes de contrôle
aux
structures mécaniques
en
réponse aux problèmes vibratoires

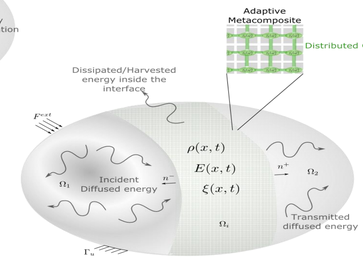


[1]

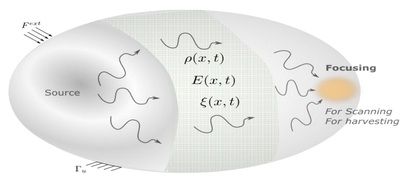
« Fonctionnaliser » la matière et les structures



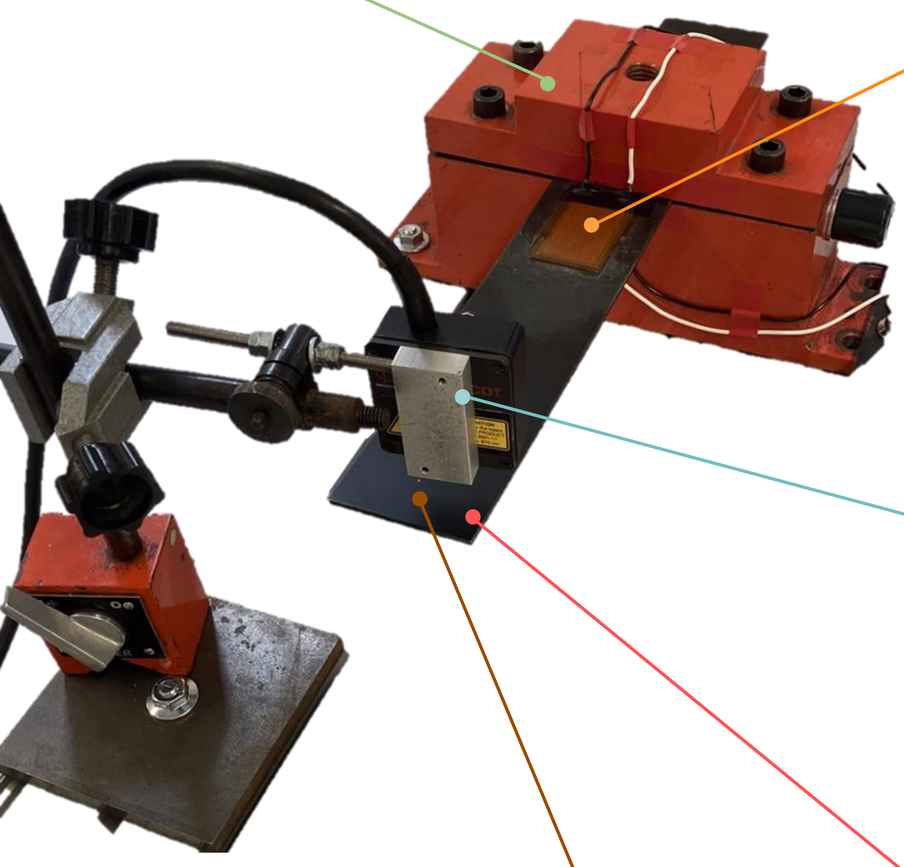
Diode mécanique



Diffusion d'énergie

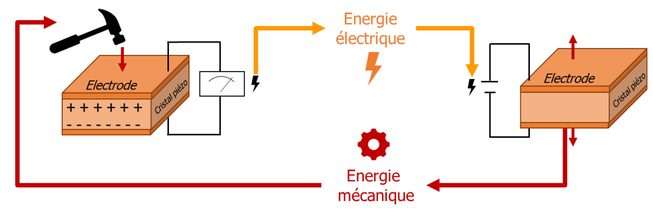


Focalisation d'énergie

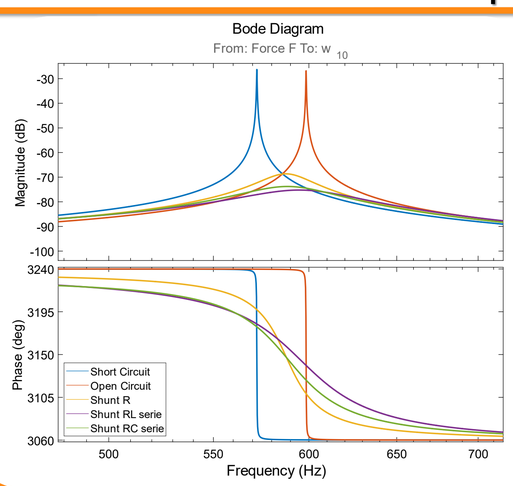


Méthode physique

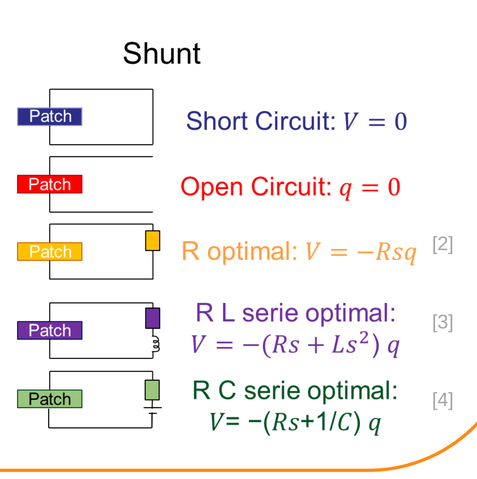
Transducteur: Patch piézoélectrique



Actionneur semi-actif: Patch piézoélectrique shunté

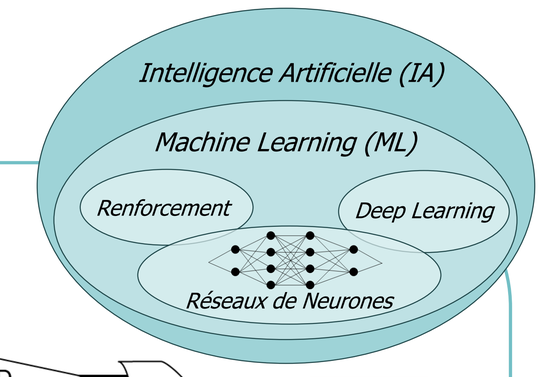


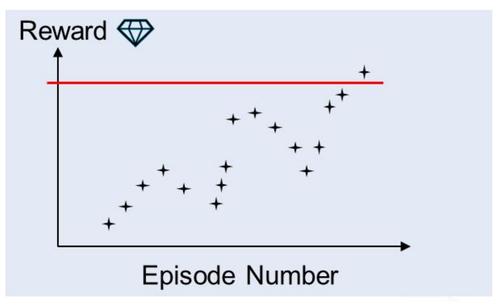
Shunt

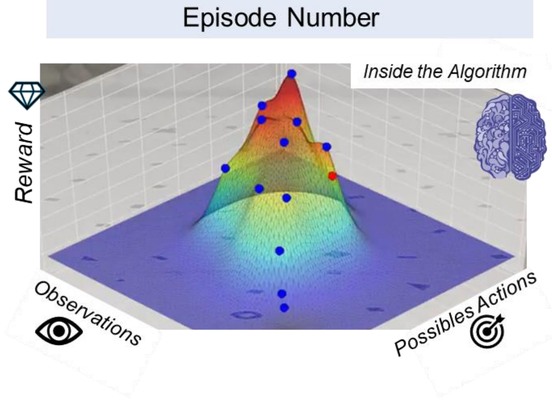


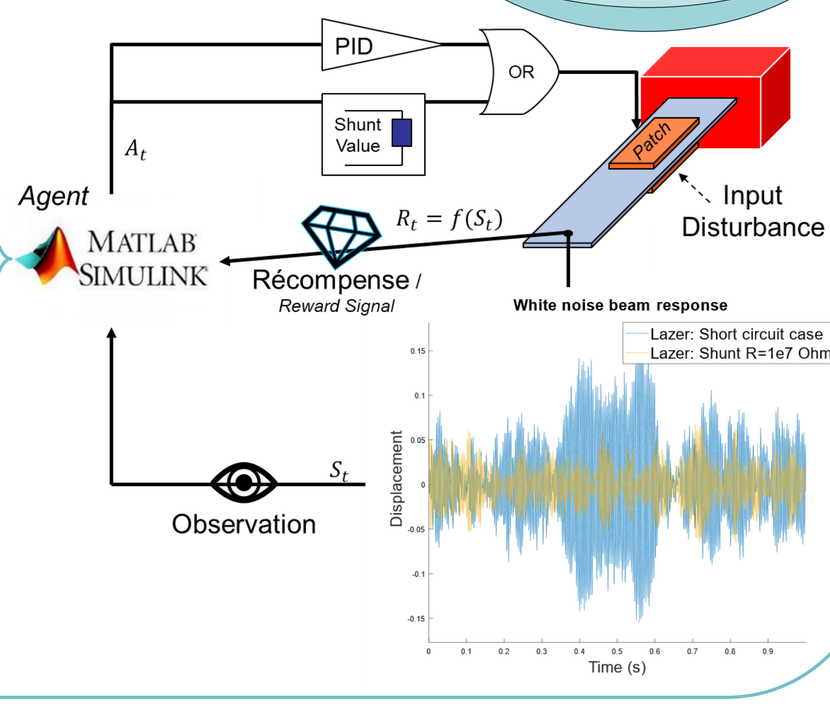
Contrôle numérique

Intelligence Artificielle: Renforcement







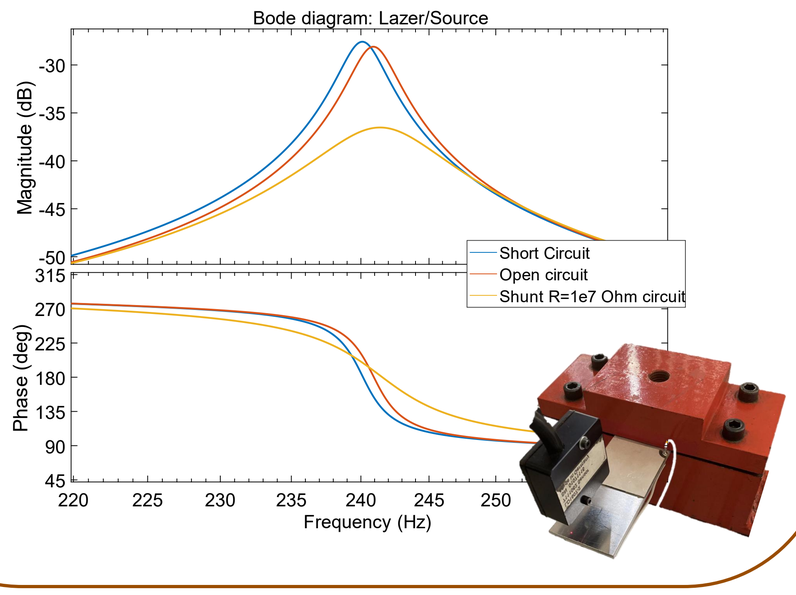


https://www.youtube.com/watch?v=GiqNQdzc5T

Résultats

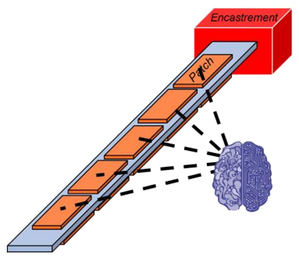
Etape 1: Poutre Mono-patch

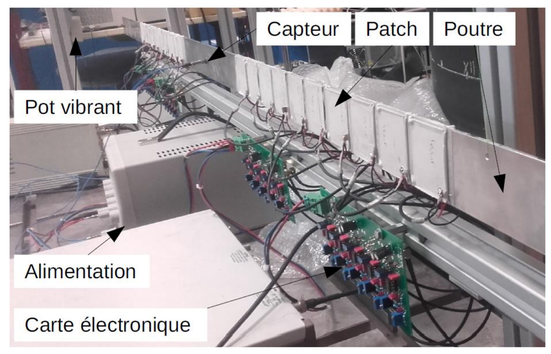
Optimisation du coefficient de couplage piézoélectrique dynamique



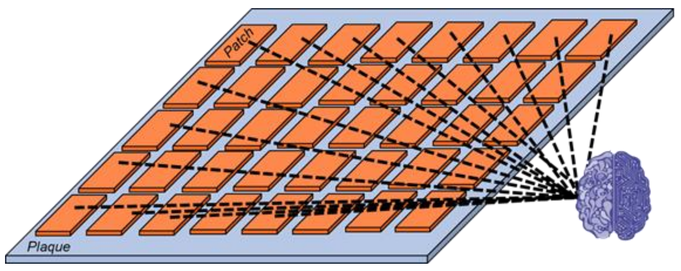
Perspectives

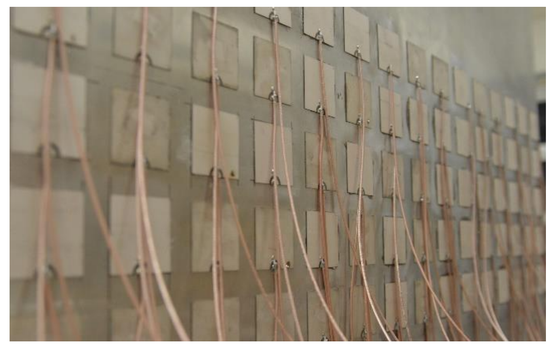
Etape 2: Poutre Multi-patch





Etape 3: Plaque Multi-patch





[1] K. Yi, M. Monteil, M. Collet and S. Chesné. Smart metacomposite-based systems for transient elastic wave energy harvesting. Smart Materials and Structures 2017, 26 (3), 035040, IOS Press.
[2] N. W. Hagood and A. von Flotow, Damping of structural vibrations with piezoelectric materials and passive electrical networks, journal of sound and vibration 146 (1991), pp. 243–268. doi:10.1016/0022-460x(91)90762-9.
[3] A. Preumont, Vibration Control of Active Structures, 2018. doi:10.1007/978-3-319-72296-2_9.
[4] M. Collet et al., Vibroacoustic energy diffusion optimization in beams and plates by means of distributed shunted piezoelectric patches, 2011, pp. 265–302. doi:10.1007/978-94-007-1703-9_10

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