Name	Job Title	Area of Expertise
HARADA Akira	Assistant Professor	Dynamics of Machine

1. Main Research Topics

Even something very simple can exhibit unexpected behavior if handled in a clever way.Conversely, even something that is very complex can appear very simple when viewed from a different perspective.I am researching on methods for identifying the inherent characteristics of such systems and how to connect the identified characteristics to useful applications.

The main themes currently being addressed are listed below.

① **Application of metamaterial / bandgap principles in vibration control and seismic isolation**

In the world of electromagnetic waves, it has been noted that when the governing equation in a coupled system is transformed into an equation involving only the variables of the main system and the relationship between the variables of the secondary system (the equation of motion of the assumed system), the physical properties of the assumed system show negative values. This principle of metamaterials and band gaps can also be applied to the world of solid vibrations, demonstrating that it can be used for vibration control and seismic isolation purposes.

ex)Dynamics and Design Conference 2024

② **A Method for Creating a Reduced-Order Model for Nonlinear Vibration of a Distributed Parameter System**

I showed that it's possible to make a reduced-order model for weak nonlinear vibrations near linear natural frequencies by combining linear mode and POM (Proper Orthogonal Mode).

ex)Dynamics and Design Conference 2020

③ **Vibration control and seismic isolation methods from the viewpoint of wave propagation**

By utilizing the fact that the equation of motion for a spring-mass system is equivalent to the central difference approximation of the wave equation, I demonstrated that reflection does not occur and resonance does not occur by applying a control force so that the end where the traveling wave is reflected becomes equivalent to a continuous part in terms of mechanical conditions.

ex)https://doi.org/10.1299/transjsme.14-00629

④ **Parameter Identification of Orthotropic Anisotropic Laminates Using Optimization Techniques**

By appropriately setting the evaluation function, it was demonstrated that, theoretically, the fiber orientation angle and material constants of orthotropic laminated plates can be simultaneously identified.

ex)Dynamics and Design Conference 2021

2. Keywords

Dynamics of Machine, Distributed Parameter System, Nonlinear Vibration, Analysis Method

3. Remarks and Websites

researchmap: https://researchmap.jp/a_harada
Laboratory: https://www.st.nagasaki-u.ac.jp/laboratories/haradaakira/

Be firmly grounded in the fundamentals,
without forgetting the purpose of engineering,
in order to gain new insights,
I strive every day.