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Horizontal Stability of a Quasi-Zero Stiffness Mechanism Using Inclined Linear Springs

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ABSTRACT: Negative stiffness mechanisms have seen renewed attention in recent years for their ability to reduce the resonance frequency of a structure without impeding their load-bearing ability. Such systems are often described as having quasi-zero stiffness when the negative stiffness is tuned to reduce the overall stiffness of the system as close to zero as possible without creating an instability. The system analysed in this work consists of a vertical spring for load bearing, and two symmetric inclined springs which behave with a snap-through effect to achieve negative stiffness. While this structure has been analysed extensively in the literature, generally only the stiffness in the vertical direction has been considered in the past. Here, the
horizontal stiffness is assessed as well, and it is shown that it is possible to achieve quasi-zero stiffness in both directions simultaneously if the spring stiffnesses and pre-loads are chosen appropriately. Attention is paid to the tuning required in order to set the equilibrium point at a position which is arbitrarily close to having quasi-zero stiffness while avoiding issues arising from mechanical instability.

**Characterising Noise and Annoyance in Homes Near a Wind Farm**

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**ABSTRACT:** This study examines the relationship between indoor sound pressure level, local weather conditions, wind farm output power and resident rated annoyance in homes near a wind farm. A new methodology is presented that simultaneously records resident rated annoyance and corresponding time-series noise data while continuously monitoring one-third octave band noise levels and local weather conditions. Results of indoor noise and annoyance monitoring are presented for two homes near a wind farm whose residents claim to be annoyed by wind farm noise. Annoyance was found to be related to the overall noise level; however, noise levels were more strongly controlled by local wind speed.

**Free Vibrations of Interspersed Railway Track Systems in Three-Dimensional Space**

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**ABSTRACT:** Statistically, the actual loading conditions for railway tracks are rather dynamic and transient. The dynamic loadings due to train and track interactions redistribute from the rails to the rail pad, from the rail pad to the railway sleeper, and from the railway sleeper to the underlying ground. Commonly, railway sleeper in track systems is modeled as a beam on elastic foundation. This study makes use of a calibrated finite element model of railway sleepers in a track system, in order to investigate the resonant frequencies and associated mode shapes of railway components in interspersed track systems. The numerical model takes into account the tensionless characteristic of the elastic support as well as the more realistic partial support
condition. Using a finite element package STRAND7, the dynamic finite element model of the railway concrete sleeper was precisely established. The dynamic model has then been extended to demonstrate free vibration behaviours of the railway tracks. The effect of interspersed patterns (1 in 2; 1 in 3; and 1 in 4) on railway track dynamics has been firstly investigated and presented herein.

**Comparison of Measured and Simulated Room Acoustic Parameter Values Using High Resolution Grids**

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ABSTRACT: When the acoustic properties of enclosures are evaluated, it is normal to use measured and simulated data. So when an auditorium is already built, the usual strategy to analyse the parameter values spatially consists of obtaining experimental results from a few receivers and using this data to validate a simulated model. Working on the basis of acoustic parameter measurements made seat by seat in a medium-sized auditorium, this document analyses a simulation program’s capacity and limitations in terms of predicting values for these parameters.

**In Situ Calls of the Marine Perciform *Glaucosoma Hebraicum***

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ABSTRACT: West Australian dhufish (*Glaucosoma hebraicum*), a marine perciform, possess a swim bladder which has associated muscles that are used in sound production. Individuals have been recorded producing sounds during capture that may be associated with disturbance from their normal behaviour. To determine whether individuals produce sound during natural behaviour, a passive sea-noise logger was deployed on the seafloor for one month in close proximity to low-relief artificial substrates occupied by *G. hebraicum*. During this time, both
juvenile and sub-adult G. hebraicum were observed within metres of the logger on numerous occasions. At approximately the same time, sounds with characteristics similar to the disturbance calls of G. hebraicum were detected by the logger. Two types of swimbladder generated calls were recorded, one of widely-spaced pulses and the other of pulses in quick succession. The maximum received levels and sound exposure levels of the recorded calls were 132 dB re 1 ?Pa and 121 dB re 1 ?Pa2.s, respectively. Based on previously determined G. hebraicum source levels and time of arrival techniques (direct and surface-reflected ray paths), the vocalising fish were estimated at between 1 and 19.5 m from the hydrophone and thus within the area where they had been observed. This study has provided evidence that juvenile G. hebraicum produce sounds at similar source levels to those generated during human-induced disturbance. This indicates that sound is produced by individuals of this species during normal behaviour, but may or may not be associated with natural sources of disturbance.

**Narrowband Source Localisation in the Deep Ocean Using a Near-Surface Array**

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ABSTRACT: A narrowband source at moderate range can be localised in a deep ocean using a near-surface vertical linear array without knowing the bottom properties. By casting the localisation as separate estimations of the source range and source depth, the performance is much better than that of the matched-field-processing (MFP) technique with the Bartlett processor. Source range estimation is based on the weighted subspace fitting technique with modification to consider the array tilt. Source depth estimation is based on the time delay of multipath arrivals. Experimental results using explosive sources are shown. The presented method shows a significant improvement in performance.

**IRIS - The Sound of Science**

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ABSTRACT: Recently developed equipment provides unprecedented access to 3D room acoustic analysis.
Traffic Noise as a Factor Driving Apartment Prices - A Case Study of a Large European Urban Agglomeration

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ABSTRACT: This paper presents an analysis of the correlations between apartment prices and road traffic noise levels in Olsztyn, the capital city of the Region of Warmia and Mazury in north-eastern Poland. The results of this study presented in graphic and analytical form indicate that noise pollution is an important determinant of the prices of residential property.