Scilight

NEWS | NOVEMBER 07 2022

The droning of the drones FREE

Ben Ikenson

Scilight 2022, 461101 (2022)
https://doi.org/10.1063/10.0015152

AIP Publishing

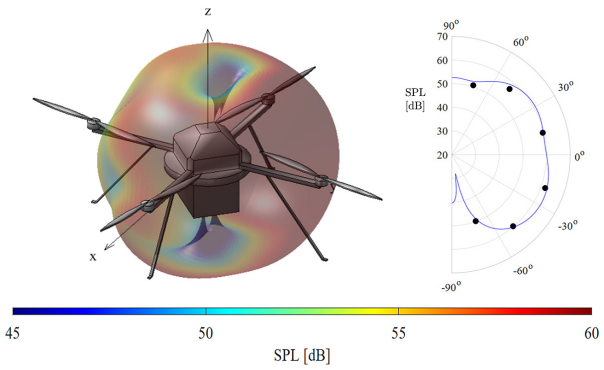
Scilight

7 November 2022

The droning of the drones

Ben Ikenson

New measurement setup can gauge noise emissions from drones and more



Drones are becoming a ubiquitous presence, used for a growing number of commercial and recreational purposes, from delivery services to photography, as well as for aerial monitoring. While their potential utility seems practically limitless, the noise they generate, especially at low altitudes around urban areas, may be not only a nuisance but a public health issue.

Because they're so compact, drones produce distinct acoustic signatures. Most prominent is the noise created by rotating blades at the blade passing frequency. Beneath this is typically a so-called tonal noise, the common culprit for annoyance, among other sounds.

Alkmim et al. developed an experimental setup to measure drone noise via a hemispherical microphone array that enables holographic sound visualization with a spherical harmonics representation.

"For the drone tested, we observed the directivity pattern changed considerably depending on the analyzed rotational speed of the propellers," said author Mansour Alkmim. "And it was shown that the third-order spherical harmonic representation is suitable to capture the radiation pattern of the drone up to the first blade passing frequency."

The team also investigated sound perception in terms of psychoacoustic metrics (such as loudness, sharpness, roughness, fluctuation strength, and tonality) by reconstructing the sound field at the listener's location. The initial results are promising and can be extended to higher frequencies and to other relevant metrics.

"The proposed measurement setup has many potential uses besides the development of noise emission metrics for drones," said Alkmim. "For instance, it can be used to assess the noise impact in urban centers through auralization techniques and to generate training data for drone noise detection algorithms."

Source: "Drone noise directivity and psychoacoustic evaluation using a hemispherical microphone array," by Mansour Alkmim, João Cardenuto, Elisa Tengan, Thomas Dietzen, Toon Van Waterschoot, Jacques Cuenca, Laurent De Ryck, and Wim Desmet, *Journal of the Acoustical Society of America* (2022). The article can be accessed at https://doi.org/10.1121/10.0014957.