LETTER TO THE EDITOR

Henri Boutin, John Smith and Joe Wolfe
School of Physics, University of New South Wales, Sydney

INFRASOUND SENSITIVITY AND HARMONIC DISTORTION

Human sensitivity to infrasound (IS) and the problems that it may or may not cause have become topical recently because of wind farms and both have been discussed here [1-5]. Determination of sensitivity to IS and assessment of its effects are complicated for several reasons.

One complication is that some common sources of infrasound with significant intensity, such as wind turbines and surf beaches, also emit power in the audible range, and that audible power is modulated at one of the IS frequencies. This makes the source audible and readily identified. If the source is regarded as an unattractive rather than a desirable feature, this modulated audible sound may become a nuisance and so could possibly trigger reactions that are not directly due to the IS component. (In contrast, one of the authors can report that three decades of living opposite a surf beach seem to have had no negative effects.)

Another complication is the difficulty of determining human sensitivity to IS. For low frequencies and high power, loudspeakers usually have harmonic distortion of one percent (–20 dB) or more. Because the sensitivity of the human hearing increases dramatically with increasing frequency below about 100 Hz, even small amounts of harmonic distortion of pure IS tones could produce audible distortion at higher harmonics.

In a recent research project studying nonlinear acoustical effects in a completely unrelated field, the present authors desired a powerful, low frequency source with very low harmonic distortion. This led us to develop a method of cancelling harmonic distortion and intermodulation products using an iterative method [6]. To demonstrate this, we used a loudspeaker that, at 107 dB, initially produced 10% harmonic distortion when driven with an input sine wave of 52 Hz (chosen to avoid confusion with harmonics of mains noise). This iterative method reduced the harmonic distortion over the audible range to less than –65 dB. One of the purposes of this letter is to draw this method to the attention of researchers seeking pure, low frequency sine waves for psychophysical measurements.

Henri Boutin, John Smith and Joe Wolfe
School of Physics, University of New South Wales, Sydney

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