

Simulating bat echolocation

Fons De Mey, Jonas Reijniers, and Herbert Peremans

The Journal of the Acoustical Society of America, November 122(5), 2946

In accordance with the growing practice of performing acoustical experiments in virtual reality, the acoustic properties of the echolocation system of a number of bat species are characterized in simulation. The head related transfer function (HRTF) and interaural intensity differences (IIDs) from the pinnae and the radiation pattern from the noseleaves are calculated with a boundary-element method. The obtained results are compared to actual acoustic measurements performed on other specimens of the same species. This comparison shows that performing the experiments in virtual reality is a viable alternative to performing measurements on real specimens. It has the additional advantage that the spatial resolution that can be achieved compared to the more commonly used acoustical measurements, is higher. Furthermore, computer manipulation of the virtual morphology model allows characterizing the influence of different head parts on the HRTF and the noseleaf radiation pattern. To illustrate the power of this technique, the effects of different head parts on the HRTF of the phyllostomid bat *Phyllostomus discolor* are investigated. For this species, it is concluded that the pinna has a larger effect on the interaural intensity difference (IID) pattern than the head itself.