

Editorial

Jaywant H Arakeri, Associate Editor

The tsunami that struck several south Asian countries on 26 December 2004 reminds us, notwithstanding our egos, that we, *Homo sapiens*, are miniscule in the face of Nature. Indeed, what would seem a small perturbation to the Earth – a very small shift of about 10 m over a very small area of the ocean bed – was devastating to millions of people. Starting as a long, small-amplitude wave, barely noticeable in the open ocean, the tsunami developed into 30 feet high walls of water as it neared a coast and swept away everything in the way. Such waves travel at a speed of \sqrt{gh} , accounting for the observed high wave speed of 700 kmph corresponding to an ocean depth (h) of 4 km and acceleration due to gravity (g) of 9.8 m/s^2 . Nearing the coast, the depth and the wave speed reduce, but the height of the wave rapidly builds up. The article by Shetye of NIO, Goa, written at short notice, lucidly explains tsunamis with special reference to the most recent one. The poster (pp.95–96) of the satellite images provided to us by NRSA, Hyderabad vividly depicts the havoc caused by this tsunami.

This issue is about bats, in particular how certain species of bats ‘see’, using sound. They emit bursts of sound lasting a few thousandths of a second and sense the reflected and scattered waves from an object as tiny as a fraction of a millimetre. Donald Redfield Griffin, who discovered the phenomenon, and appropriately termed it echolocation, is the featured scientist. The article by Raghuram and Marimuthu gives the history of the discovery of echolocation and the principles involved.

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Email:
jaywant@mecheng.iisc.ernet.in

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subject. Sonar based devices in air (they already exist in water) will be a boon to the blind, though, perhaps the motivation for their development will come from military applications. It seems that a sequence of bursts of sound, with changing frequencies, will lend itself to wavelet analysis, rather than to the more common analysis using Fourier Series. Recently *Resonance* had two articles on wavelets by Nanavati and Panigrahi and their colleagues; in this issue, they look at the applications of wavelets to image compression. We certainly look forward to wavelet analysis being applied to bat sound bursts.

Bats are also the subject of the Personal Reflections article by Chandrashekar. He tells the story, enlivened by incidents and details that only a participant would know, of a scientific adventure in the hills and caves surrounding the campus of the Madurai Kamaraj University. The story also reinforces a common belief among scientists that studying local problems, rather than following the crowd, leads to outstanding and original research.

In the Classroom section, we start a new series of articles on free radicals by Nagendrappa. Free radicals, which are highly reactive and cause cellular damage, have gained recent notoriety because of their probable damaging role in heart disease and cancer. We are being constantly urged to consume ample quantities of antioxidants to prevent free radical damage and in general to maintain good health.

In our on-going series, Earthquake Tips, Murthy explains how simple design changes can make buildings more earthquake resistant. The more we know about tsunamis and earthquakes, the better prepared we can be to restrict damage from future disasters.

