THE CONSULTANT

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Chairman's Corner — *John Dunn, President, Ambertec, Inc.*

On a couple of different occasions, I needed to move a plastic tray of roughly 12 by 18 inches, filled with a couple of inches of water, from one part of a building to the other. At first, I tried to simply carry the thing and it was a real challenge not to spill it. Slosh, slosh, round and about, oh boy!

So the next time, I thought I'd smarten up and got this really slick rolling cart with great big smooth riding wheels. That cart would glide across a tile floor like Michelle Kwan on ice.

I put the filled tray on the cart and started off down the hall, but it wasn't long before the water started to really swing around in there, slosh, slosh, round and about, good grief!!

What I hadn't considered was that as smooth as the cart's ride was, it still had some roughness and that the roughness' noise was operating on the water like a broadband, mechanical noise source. The water in the tray had some mechanical resonant frequency and would extract energy at that frequency from the broadband spectral content of the floor noise, thus building up a resonant back and forth motion until something got wet, namely me.

It was quite a physics lesson.

The other day, I was standing on the second floor of the Roosevelt Field shopping mall where I found myself thinking about how all the feet and baby strollers of people passing by would probably make a pretty good broadband, mechanical noise source.

Then, I felt the floor under me oscillate, just a little bit.

Hmmmmmm.

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Meetings

April 2006

Topic: "CPR"
Speaker: Mr. Norman Weingart, Syosset, NY.

Coronary heart disease causes 350,000 out-of-hospital deaths per year. Most heart arrests involve ventricular fibrillation (VF). VF and tachycardia can be stopped by an Automatic External Defibrillator (AED). We were shown how the AED is used. There is only a 6.4% survival rate for witnessed heart attacks. The survival rate is 49 - 74% when a defibrillator is used. The AED costs about $1300. Batteries and contact pads must be replaced periodically.

May 2006

7:00 PM, Wednesday, May 3, the first Wednesday of the month. Briarcliffe College, 1055 Stewart Avenue, Bethpage, NY

Topic: "The Consultant's Business Climate"

Admission is free (no charge). No pre-registration is required. For further information, contact the Chairman, John Dunn, by e-mail: ambertec@ieee.org, or by telephone: (516)378-2149.

Members are asked to e-mail discussion topics, notes, commentary, sage wisdom, advice and counsel to John.

Another Organization

The New York Society of Professional Inventors held its regular monthly meeting on April 26. The topic was "An Online Patent Management System" by Stanley Kremen, a registered patent agent and Managing Partner of PatentsGroup. Their website, www.patentsgroup.com, describes a virtual office that enables an individual inventor to file for patents over the internet with the help of a professional staff that interacts electronically with clients and the U S and foreign patent offices. The U S and European patent offices have recently gone "paperless." The low overhead of the virtual office enables individuals to file at greatly-reduced cost, and should be of interest to LICN members.

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Hurricanes — *Dr. Richard LaRosa, sealevelcontrol.com*

"Divine Wind" is the title of a book on the History and Science of Hurricanes published by Oxford University Press in 2005 before Katrina struck. Its author, Kerry Emanuel, is a Professor of Earth, Atmosphere, and Planetary Science at MIT. He is one of the foremost experts on hurricanes. The book has a wealth of photographs, paintings, poetry, historical descriptions, and scientific explanations.

The title "Divine Wind" comes from the belief of the Japanese that their gods twice sent a divine wind, or kamikaze, in the form of a typhoon to save them from Mongol invaders. Admiral "Bull" Halsey, Commander of the U.S. Third Fleet in World War II, also met disaster in the form of two typhoons.

It was interesting to learn that Bermuda was settled by the crew and passengers of a ship that was wrecked and driven ashore by a hurricane. There are accounts of many famous and deadly tropical cyclones. All of this was a bonus to me. What I needed was a better understanding of why the air rising in the eyewall goes around the eye in a cyclonic (counter-clockwise in the Northern Hemisphere) direction. It appears to be that the air rising in the eyewall causes a low pressure at sea level. Air near the sea surface is drawn toward the center because of the low pressure. At great distance from the center, the flow is radial, but the Coriolis force turns the flow toward the right (N. Hemisphere), and by the time the inrushing air reaches the eyewall it is moving at almost constant radius in the cyclonic direction.

When the air reaches the top of the hurricane, it moves out in a radial direction and is then turned in an anti-cyclonic direction by the Coriolis force. The change from cyclonic in the eyewall to anti-cyclonic in the spreading top conserves the overall angular momentum. People at sea level, where all the destruction occurs, are subjected to the cyclonic winds, so they would naturally call the storm a cyclone.

The Coriolis force on the inrushing low-altitude air is responsible for spinning up the rising air. The Coriolis force is proportional to the sine of the latitude, so there are no cyclones near the Equator, even though the sea surface is warm. Cyclones are called "hurricanes" in the Atlantic, "typhoons" in the western Pacific, "severe tropical cyclones" in the southwest Pacific, and "severe cyclonic storms" in the northern Indian Ocean. "Cyclone" comes from a Greek word meaning "coil of a snake."

Air near the eyewall rises because it expands as it acquires the latent heat of the condensing water vapor. The water vapor condenses because the temperature of the expanding air is lowered below the dew point. The air spreading out at the top might be at –70 °C and the surface temperature is +30 °C, so the temperature drop of the working fluid is 100 °C. The absolute heat source temperature is about 300 K, so the thermodynamic efficiency of the hurricane heat engine is 100 / 300 = 33 %.

Pity the poor OTEC plant that must derive pumping power from the 25 °C difference between the top and bottom water in the Gulf of Mexico. Its thermodynamic efficiency would be 8.3 % if there were no temperature drops in the evaporator and condenser heat exchangers. After accounting for these drops, the turbine converts into mechanical shaft power only about 3 % of the heat energy flowing from source to sink.