THE CONSULTANT

The Newsletter of the IEEE Consultants Network of Long Island

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

On October 4, 1957, the Soviet Union launched Sputnik into orbit to the shock of a whole lot of Americans. Although then president Dwight D. Eisenhower accepted the event quietly by saying that he was not concerned "one iota" about any implications for American security, the American public was by and large traumatized. Fears over the "missile gap" were all over the newspapers and got carried forward from there into the 1960 US presidential election.

Suddenly there was a sense of urgency, even panic, about the scientific educations of American children. Somewhere, somehow, it got pointed out to the general public that computers, those marvels of absolutely infallible technology created by geniuses, didn't do their calculations in the decimal system, but worked their miracles in binary, octal, duodecimal or hexadecimal arithmetic which meant that we had better enable our kids to also do their arithmetic in base two, base eight and so forth, not just the old fashioned way in base ten.

Thus was born "the new math", an utterly misguided educational blunder of colossal magnitude, the result of which was to produce an entire generation of Americans who simply could not cipher at all, not even in base ten.

Cartoonist Walt Kelly of Pogo fame fingered it right when the denizens of the Okefenokee Swamp took up the "after math". The answer to every example was zero which is what you had after everything else was gone.

As with recent worries about bridge and infrastructure maintenance issues, we seem as a nation, unable to learn from past mistakes. Now, instead of the new math, we have No Child Left Behind (NCLB).

For a start at looking at why we are in national trouble because of NCLB, please see http://www.education-world.com/a_curr/profdev077.shtml and read the article by Max W. Fischer, Education World®.

More next time.

Meetings

October 2007

Topic: A Brief Introduction to CAD and Solid Modeling

Speaker: Mr. Stu Senator, Dunton Design Associates, Inc.
Patchogue, NY

Regarding our new directory and/or alternatives, they will be in color, and the format(s) is/are yet to be chosen. We still must generate a mailing list.

We should inform the members about seminars and other items that might be of interest. E-mail: members@consult-li.com.

November 2007

Topic: The Judgment Aspect of being a Consultant

Moderator: Mr. John Dunn, Ambertec, Inc., Merrick, NY

Time: 7:00 PM, Wednesday, November 7

Place: Briarcliffe College, 1055 Stewart Avenue, Bethpage, NY
See website for directions: www.consult-li.com

Admission is free (no charge), and no pre-registration is required. For more information, contact Chairman John Dunn at (516)378-2149 or e-mail ambertec@ieee.org.

You have to rely on your *Judgment* when forced to make decisions based on incomplete information. E-mail examples from your experience to John Dunn. He will remove identifiers so that the stories can be presented at the meeting.

Other Meetings

Consult the Events Calendars on the Section website: www.ieee.li and the LICN site: www.consult-li.com.

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Wave-Powered Upwelling — *Dr. Richard LaRosa, sealevelcontrol.com*

A new company, Atmocean, has a website, www.atmocean.com which describes a system that upwells ocean water from depths of 200 to 300 meters to cool the surface and provide nutrients for photosynthesis. Wave motion pumps the water up through hoses made of thin plastic film. The hose diameter is 2.5 to 3.0 meters. The hose is collapsed flat and is wound around a cylindrical float for easy storage and deployment. A heavy check valve is attached to the bottom end of the hose, and the float is attached to the top end to provide buoyancy.

When thrown into the water, the flattened hose unwinds from the float and the heavy check valve extends the flattened hose to full depth. Wind-driven waves cause the water particles at the surface to follow circular orbits with particles moving in the direction of wave travel at the top of the orbit. The diameter of the orbit decreases with increasing depth. The float at the top of the hose goes up and down but cannot follow the full crest-to-trough height of the wave. The check valve assembly has the same vertical motion as the float, but the water surrounding the check valve has very little motion. When the hose and check valve descend, the check valve opens and water enters the bottom of the hose and starts to expand it into a circular cross section. On the upstroke, the check valve closes and the partially filled hose follows the upward motion of the float. After enough cycles, the hose is completely filled and expanded to its circular cross section. Note that the buoyancy of the float must be great enough to accelerate the water-filled hose in the upward direction. If you think about the inertial mass of a slug of water 3 m in diameter and 300 m long, it is apparent that the buoyancy of the float must be limited to a value that will not rip the plastic hose apart. This is why the float will be completely submerged when the wave rises and the float motion amplitude will be much less than the wave amplitude at the surface.

Once the hose is completely expanded, the open check valve allows the hose to slide between the inner and outer water columns on the down stroke. When this happens, some of the water at the top of the inner column will leave the top of the hose and join the surface layer of the ocean. Thus, cool water from 200 or 300-m depth will, we hope, mix into the surface layer instead of forming a large mass of heavy water that sinks back down to where it came from. The Atmocean website does not explain these details of the wave pumping operation. I infer them from the photographs and other material on the site. There is much literature on wave-powered pumps which I have not yet studied. The value of upwelling nutrients for aquaculture has been recognized for a long time. The Atmocean work may be able to get it started on a useful scale.

The website makes some quantitative predictions about the surface cooling rate and the rate at which CO2 is sequestered on the ocean floor. The nutrients brought up with the cold water encourage the growth of phytoplankton and these are eaten by zooplankton, which are eaten by successively larger creatures in the food chain. Some of the phytoplankton are eaten by salps, which are small jelly-like creatures that have been mostly regarded as a nuisance. Salps are not a useful food for other species. Salps just eat, reproduce, and defecate. They produce large fecal pellets which sink to the bottom more rapidly than the fecal pellets or dead bodies of more respectable creatures. The slow-sinking organic matter from the "good" creatures decomposes on the way down and is returned to the ocean as CO2, whereas the salp fecal pellets stand a good chance of reaching the bottom and remaining there for a long time as organic matter. The salps come up to the surface to feed at night. During the day they are at depths of about 2000 ft, so much of their fecal material is already well on its way to the bottom when it is discharged. Thus it is hoped that the salp will help to sequester the CO2 that is converted to organic matter by the phytoplankton.

Wave-powered upwelling was recently the subject of a paper in *Nature* by James Lovelock and Chris Rapley, who also invoked the salp as part of the sequestration process. Their equipment design was not as specific or as well-developed as the Atmocean design. The Atmocean website shows their device being deployed and tested.

WAVE POWER vs. OCEAN THERMAL ENERGY

Previous newsletter articles have discussed and promoted the use of a heat engine to convert the solar energy stored in the ocean surface water into pumping power. The equipment is large and expensive. It will only work in the tropical ocean, and it has not been demonstrated yet. Its direct competitor, the Atmocean wave-powered upwelling pump, is inexpensive, will work anywhere there are waves, and has been demonstrated. The latter looks like a clear winner.

However, the ocean thermal energy design brings up colder water with more nutrients, and I have estimated that a million cubic meters per second must be upwelled in order to make an observable improvement in climate and ocean food production. The wave-powered system will have to pump more water to match this performance. The performance claimed by Atmocean for their system is stated in terms that must be made compatible with the performance claimed for the ocean thermal energy design. This will be the next step in my program, and I have made some progress while writing this article. I may have some results for the next newsletter.

One further remark: The initials OTEC do not have a meaning that is confined to ocean thermal energy conversion. There is a new kid on the block, a company called Ocean Technology & Environmental Consulting. They are growing kelp in pools near power plants to absorb CO2. The kelp is a good source of biofuels. The power plants do not need to be near the ocean. Their website refers to algal biofuels. Theirs was about the 150th name or topic that turned up when I googled "OTEC". There are about 5,220,000 entities corresponding to OTEC, and most of them have nothing to do with ocean thermal energy. Therefore, I will write the words rather than use the acronym. The people who have been working on this technology for years will not appreciate me abandoning their acronym any more than they appreciate me claiming that they cannot export commercially useful power. C'est la vie. Let them tell me I'm wrong instead of ignoring me.