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Engineering Education in the 21st Century: Issues and Perspectives

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Engineering Education in the 21st Century: Issues and Perspectives

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This topic was addressed specifically in a Plenary Session convened at the International Conference on Electromagnetics in Advanced Applications (ICEAA), Torino, Italy, September 10-14, 2001, which I organized. In a brief introductory paper entitled. "Teaching Analysis to a Computer-weaned Generation: Asking Questions", I attempted to highlight various aspects, which were dealt with in detail by the papers that followed. Within this context, a major challenge is to persuade EE students to become exposed to electrodynamics. The item that follows has been taken from *IEEE Antennas and Propagation Magazine*, Vol. 46, No.5, October 2004:

Electrical engineering students, enrolled in Electrical and Computer Engineering Departments, usually show a preference for options in systems and data processing, and are less than enthusiastic about courses in wave dynamics. To tickle a prospective signal processor's curiosity, wave-oriented instructors use their ingenuity by demonstrating on practical examples how knowledge of information-conveying wave dynamics between source and receiver can facilitate the processing of the input-output data at the "black box" terminals. If he/she takes the bait, the rhymes that follow encapsulate what lies ahead:

Waves are waves, no matter where

Engineers who deal with waves
Know that each of them behaves

Sometimes well but sometimes strange.
How do wavelets re-arrange?

Are they trapped or do they leak?
Is their signal strong or weak?

Are they bound within a beam,
Flowing like a narrow stream,

Or distorted by dispersion
And by inter-mode conversion?

Understanding waves is fun.
Once your study has begun,

Though first progress may be slow,
You will never let it go,

Since continued exploration
Brings you constant fascination.

In a Wave-Dynamics Group,
Waves are studied in a loop

That contains experiments
Which, so that one comprehends,

Are by modeling exposed,
And the loop is thereby closed.

Joining, you'll define your quest,
Search for models, find and test,

Try ideas' fertile mix,
And come up with clever tricks.

If it works, that's your reward!
Adding knowledge can be sport.

Happy hunting!

Returning to the special ICEAA session as such, documentation appeared in the *IEEE Antennas and Propagation Magazine*, Vol. 43, No.6, 2001. Further exposure of this subject area was achieved in the "Special Issue on Electromagnetic Problems and Numerical Simulation Techniques: Current Status-

Future Trends", ELEKTRIK, Vol.10, No.2, 2002, which was guest-edited by Prof. Levent Sevgi – my former student, good friend, colleague and collaborator – with a dedication to me, and an invitation to contribute an opening Personal Note.

Against this background, Prof. Sevgi, as Guest Editor of the present Special Issue of ELEKTRIK, has invited me to submit an opening Preface. I expressed to him my sincere appreciation, and my intent to use this opportunity a) to reaffirm my long-standing scientific, personal and cultural affiliation with Turkey, b) to attempt a retrospective on the achievements in wave dynamics during the second half of the 20th century, c) to suggest their relevance for the present century, and d) to indulge my lifelong hobby of delivering this message via a mosaic of tongue-in-cheek rhymes, extracted from my collection of poems assembled during my multi-disciplinary professional career. I hope this delivery will evoke some amusement in the reader.

Tongue – in Cheek Rhymes: My Prescription for Coping

If clever use of rhythmic verse,
Sometimes verbose, sometimes terse,

Facilitates to make a point
That throws convention out of joint,

If change in rhythm or intonation
Defies reliance on expectation,

If double meaning begets ambiguity
That challenges your ingenuity,

If accenting the wrong *syll-able*
Tends to make you irri-*table,*

If comments that project disdain
Do regularly "pull your chain,"

But if the subtle or bare-knuckle
Can cause you to emit a chuckle,

Then, happily, I can maintain
That my lifetime hobby has not been in vain.

---

* [Presented in reply to the presentation of a plaque with the citation, "*For more than two decades of capturing and conveying the spirit of the IEEE Antennas and Propagation Society in thoughtful rhyme as Associate Editor of the Poet's Corner for the AP-S Newsletter and Magazine, and as AP-S Poet Laureate*," Columbus, Ohio, June 25, 2003.]

As I Look Back Upon My Life*

I've witnessed much throughout my life,
Both good and bad, harmony and strife.

Already as a student, I
Decided that I want to teach.
My kinder critics have remarked
That when I teach, I really preach.

The theme is science, balanced
So that purity and practice blend.
Just how to blend, that is an art
That I'm still trying to comprehend.

I've been a gadfly^{+} through critique,
With questions often sharp, direct.
While this may not engender love,
It may at least entail respect.

With those who've worked up close with me,
Heated debates have spurred the quest
To find the route that formulates
A controversial issue best.

And as we inch along that path,
The sparring can become intense.
Yet close encounters of this kind
Have transformed colleagues into friends

I've seen a good part of the world,
Have personal ties in many a land
Am grateful that, where'er I go,
My friends extend a helping hand.

I've been lucky to match
My lifetime affiliations
To what I perceived to be
My professional aspirations.

As I look back upon my life
From now to where it has begun,
I ponder times both good and bad.
Yet overall, it has been fun.

Adapted from "To Felsen by Felsen", [presented by me at a luncheon in my honor on the occasion of my 66th (belated 65th) birthday at the AP-S/URSI International Symposium, Dallas, Texas, May 8,1990.]

$^{+}$ Gadfly: a fly that attacks and irritates cattle; also, an irritating person.

A. The Geometrical Theory of Diffraction (GTD): What, Where, When

1. Elation and Frustration

a) Some terminology*

Those who are addicted to HF waves
Are constantly tricked by how a wave behaves.

Just when we think that we understand,
Along comes a glitch we can't comprehend.

Our frustration shows up in how waves are defined.
Our name tags for them are anything but kind.

For (HF wave) ray phenomenology,
We have plagiarized clinical pathology.

Rays on curved surfaces creep; they are weak.
On planar slabs, rays decay; here they leak.

At an interface, rays are brutally bisected.
One part bounces back, while the other is refracted.

When a ray hits an edge, it is critically battered.
It remnants, in pieces, are conically scattered,

When a ray hits a corner, the cones disappear,
And its fragments fly up and down, front and rear.

Extracted from: Raves About Waves: We Can't Do Without Them, IEEE Antennas and Propagation Magazine, Vol. 39, No. 5, October 1997, [Presented originally at the Banquet of the International Conference on Electromagnetics in Advanced Applications (ICEAA), held in Torino, Italy, September 15-18, 1997.]

b) Uniform Theory of Diffraction (UTD)

* **(i)** Uniformized asymptotics
Can drive you straight to neurotics.

Having decided to do UTD,
You go on a fierce analysis spree,

For edges straight and edges round,
Transitions simple and profound.

The sacred function of Fresnel
Continuously does propel

The field from shadow into light.
It makes the patching come out right,

But sometimes you must add correction
Contributed by slope diffraction,

And when the rays exhibit torsion,
You must find still another portion.

Do you need higher order terms?
What does negate and what confirms?

While you were tracing rays with vigor,
Did you employ the proper rigor?

You're damned in perpetuity
If there's discontinuity

In k-terms of a given order,
When crossing holy shadow border.

What's bound to add to your frustration
Is, after doing computation,

To find, although you have been sloppy,
Discrepancies too small to copy.

You may conclude, but with much pain,
That leading terms can oft sustain

Numerically sufficient norm,
Though they're not really uniform.

What should you do? You muse and think
You seek some solace in a drink,

And sure enough, the world looks brighter
To battered asymptotics fighter.

———————-

From: "God Grant Us Uniformity", June 1980

* **(ii)** Drug users get high on narcotics.
For wave addicts, it is Asymptotics.
They adopt well-known rules,
Using physics-matched tools.
Their reward: Modernized Quasi-Optics.

What moves a wave modeler's soul?
It's a trickily migrating pole,
Which he tracks with great care,
Like a hound does a hare,
And he prays that it may play a role.

What makes the game really neat
Is a pole on the wrong Riemann sheet.
It is nonetheless captured,
(Leaving trackers enraptured)
When the pole and the SDP$^+$ meet.

No need to exude gloom and dread.
Asymptotics? Be sure, it's not dead.
As we zoom imagination
On each novel application,
There is a challenging future ahead.

———————-

* *From: High Frequency Asymptotics: It's Alive and Well*

$^+$ *SDP: Steepest descent path*

c) GTD on the Turkish Scene

(i) in Ankara*

At last, it has come to an end:
Four days, hard work, and yet well spent.

We've heard some old, we've heard some new,
We have exchanged all points of view,
Much theory, some application.
Some theories work, some cause frustration.

High frequencies and GTD
Are still around for all to see.

But when we deal with large reflectors,
Then we may have to be defectors,

Leave GTD, and being brave,
Use tricky evanescent wave.
Much has been said about computing.
It's here that there is strong disputing.
Do not be charmed by the machine!
It only yields what we feed in.
We want efficiency, precision,
But numbers don't replace the vision
That comes from insight, comprehension.
So, hybrid methods need attention,
Combining numerology
With careful methodology.

———————-

Extracted from: An Ode to the METU Symposium
[presented at Middle East Technical University (METU), Ankara, June 19, 1980.]

(ii) in İstanbul*, ICT'96

This conference was a Big affair.
I had received an invitation
To address a session organized
Especially for Wave Propagation.

Though Communication is the theme,
For those who specialize in waves,
The meeting site provides a scene
For tracking how each wave behaves.

Take target detection in noise and clutter.
Istanbul's streets can be used for a test
That lets signal processors roam and explore
Which processing strategy works best.

The traffic provides random clutter in motion,
Constrained by the sidewalks on either side.
Pedestrians trying to cross the street
Furnish a target with which to collide.

A hit indicates that a target is there,
Thus raising detection probability.

Avoiding a hit requires some stealth,
Low-contrast dress and evasive mobility..

If this defense fails and collision occurs,
Target ID+ is the subsequent job.
ID depends on what's left on the ground
After target is changed into unshapely blob.

Now is the time to resort to those tricks
That state the rules for a likely decision:
Project the blob onto reference hit lists
And thus pick out the most likely collision.

If YOU're the pedestrian, it's not a game.
Your vested interest is to survive.
If you manage the cross the street intact,
It's time to relax and enjoy new-found life.

For that, Istanbul is ideal as well.
Museums, historic sites, restaurants abound.
Whatever it is that you want to pursue,
It's likely that something can somewhere be found.

Extracted from my presentation at: ICT' 96, International Conference on Communication

+ *ID: Identification*

d) Hybrid Ray-Mode Scheme*

Guided wave modeling has evolved
Around two methodologies:
Ray fields and Modes exemplify
Complementary phenomenologies.

They both appear in phase space as
Comfiguration-spectrum representations.
Ray-fields involve *progressing* waves
While *modes* are tagged by *oscillations*.

HF+ practitioners, by and large,
Have stayed with these two methodologies,
Choosing that conceptual alternative
Which best fits perceived phenomenologies.

This ignores the elegant hybrid scheme,
Which self-consistently blends modes and rays
So that the retained portion of each
It's most advantageous features displays.

While high-speed computing is adequate,
No matter which model the user preferred,
The physics-based insights into phase space dynamics
That the hybrid-mix offers, may deserve to be heard.

Such insights may help us parameterize
Complex wave dynamics in current applications.
The problem-matched hybrid ray-mode mix
May yield better modeling implementation.

Therefore, perhaps the time has come
To revive the hybrid ray-mode mix.
Though we may not choose to compute with it,
It belongs in a modeler's "bag of tricks".

---

* *Extracted from: Hybrid Ray-Mode Scheme: Has thy time come?*

+ *HF: High frequency*

2. Spreading the Word: TARGET SORTING IS THE GAME*

a) The Mission

When truths emerge and must be heard,
Dissemination is prepared.
Evangelists did this of old
And spread the message to be told.

It has been possible to trace
How they sojourned from place to place.
Whatever land they called their home,
Their final goal was Ancient Rome.

Today, the need is much the same.
Evangelist, by different name,
Takes truths from here and brings them there.
He is the AGARD Lecturer.

He is a member of the team.
An AGARD+ Panel picks the theme.
It also a Director picks
Who chooses the thematic mix.

Each lecturer his message spouts,
Hopes to convince and leave no doubts.
Director knits each topic's patch
Into a fabric, where they match.

I am directing one such group,
With Target Sorting as its scoop.
To give it a most fitting start,
The road show did from Rome depart.

———————-

Extracted from: Poet's Corner, IEEE Antennas and Propagation Society Newsletter, December 1987

+ AGARD : NATO Advisory Group for Aerospace Research and Development

b) The Team:

L. B. Felsen (Brooklyn Poly, New York, USA),
P. Pathak (Ohio State University, Columbus, Ohio, USA),
M. Morgan (U.S. Naval Postgraduate School, Monterey, California, USA),
E. Heyman (Tel Aviv University, Tel Aviv, Israel),
K.J. Langenberg (University of Kassel, Kassel, Germany),
V. Stein (Institue for Air and Space Research, Oberpfaffenhofen, Germany),
D. Dudley (University of Arizona, Tuscon, Arizona,USA)

c) Italian Style

In target sorting – be no fool –
Diversity replaces rule.
This fact is well in Rome explored:
If there are rules, they are ignored.

Improvisation is the name
By which the Roman plays the game.
Conditions change, the tactics switch,
And all goes on without a hitch.

Survival is a bag of tricks.
Whatever fits, that's what one picks.
With such resources held at bay.
The Roman stalks and gets his prey.

The lesson for the target team:
Diversify your tracking scheme.
Watch how the Romans cross a street:
They make new rules to fit each need.

d) German Style

What place did AGARD here prepare?
The Hochschule der Bundeswehr,[+]
Where every student is cadet.
Is where the lecture series met.

One thing was not well understood:
Do lecturers receive salute?
It's legendary to expect:
In Germany, one gets respect.

For target tracking, what's the deal?
Pursuit by rule, pursuit with zeal,
Is still the way to catch your prey.
But could rules start to fade away?

For social action, it is clear;
You find a beer hall and drink beer.
One evening, AGARD served the fare:
Beer, Pretzels, Leberkas were there.

———————-

[+] *Military College*

e) Scandinavian Style

In Norway, AGARD picked a place
That on the map is hard to trace,
From urban Oslo far removed,
In setting that can't be improved.

The site was Noresund, on lake.
If one the lectures would foresake,
He could around the woodlands stroll
And hope to meet an ugly troll.[+]
But expectations came to naught.

No one did find what hard he sought.
The visitor saw things he'd buy,
But his desires went awry
When he computed purchase price.
He found it's double, maybe thrice,
What he is used to spend at home.
He wistfully remembered Rome
Where Lira did not cause him fear
The way the Kroners did it here.

———————-

[+] *Mythological creature (a nasty draft)*

f) Epilogue

We've sorted targets in three lands.
In each, we've tried to set demands
That match each audience's need.
I hope, in this we did succeed.

3. Frequency or Time Domain: Wave Modeling Alternatives

a) How some of the debates began: Venue at Polytechnic University, Brooklyn, NY

(i) Meeting # 1

It's meeting time again. The theme
Is ultrawideband EM waves,
The hope is to elucidate
How signal of this kind behaves.

Numerics and analysis.
Experiments and modeling,
All that and more defines the scope,
To which their expertise they bring.

The site is Brooklyn where one found
The well-known Brooklyn Polytech.
(It's been renamed. Most of us wish
We could get our old name back.)

The Fourier transform is the bridge
That implements duality
Between the time-harmonic waves
And those with strict causality.

To highlight the dichotomy
When time and spectrum are compared:
What's widely spread in one implies
The other is severely pared.

The "ultrawideband" label means
That Frequency is where it's at.
The "F-word" says how you would deal
With spectra that are broadly spread.

The "short pulse" label signifies
That Time resolves what you observe.
When it's the "T" word that you like,
The "F" word touches a raw nerve.

Pulse generation can be done
By rapid switching. It is plain
That such techniques yield transient bursts
Directly in the T domain.

But pulses can be synthesized
By stacking F bins like a train.
This route is based on emphasis
Directly in the F domain.

But when short-pulse bursts interact
With scatterers, then some retain,
For resonant behavior,
The routing from the F domain.

Thus, it's not trivial to predict
How best to choose between the twain.
Wise schizophrenics could propose
A hybrid F and T domain.

If these dilemmas wear you out,
The breaks in lectures keep you sane.
You get refreshed and then conclude:
A pox on F and T domain.

———————-

Extracted from: F or T? That is the Question
Poet's Corner, IEEE Antennas and Propagation Magazine, Vol. 35, No. 2, April 1993
[Presented originally at the banquet of the International Conference on Ultra-Wideband Short-Pulse Electromagnetics, held at Polytechnic University, Brooklyn, New York, October 8-10, 1992.]

(ii) Meeting # 2*

Behold, this is the second time
That Short-Pulse EM we address.
The topic has matured since we
The first time probed what we should stress.

We argued then on principles,
On what's intrinsic in TD^{+},
And whether FD^{++} processing
Explains what in TD we see.

The focus is no longer on
Dogmatic Either versus Or.
Results decide what spells success.
The music validates the score.

UWB/SP^{+++} techniques
Have progressed from the concept phase
To applications which exploit
What proper modeling portrays.

Much interest is now focused on
Inversion to produce IDs.
New processings seek to extract
The image that the data sees.

The processings can look for waves
That in the data are contained,
Or they can deal with basis sets
Where non-wave features are retained.

The option list goes on and on.
Besides a data-based ID,
We need new bases which contract
The acronym and jargon spree

That fragments what has now evolved
Into intense activity.
Let us build bridges to avoid
A growing subjectivity.

To sum it up, this meeting shows
That TD is alive and well.
The sheer diversity reflects
The uses which this theme propel.

With steadily expanding scope
And progress at a rapid pace,
New challenges will welcome us
When we meet next time in this place.

———————-

Extracted from: TD – Thou Art Alive and Well

[Presented at the banquet of the 2nd International Conference on Ultrawideband / Short-Pulse Electromagnetics held at Polytechnic University, Brooklyn, NY during April 5-7,1994.]

$^{+}$ TD and $^{++}$ FD stand for time domain and frequency domain, respectively; $^{+++}$ SP stands for short-pulse.

b) Pulsed Beam Obsession*

Pulsed Beams in My Dreams

When people dream, it usually is
About what's foremost on their mind.
It may be fame or worldly goods,
Or troubles they can't leave behind.

My dreams are often occupied
With looking for concocted schemes
That aim at finding novel ways
For using short-pulse Gaussian Beams.

A Pulsed Beam {acronym PB)
Has its peculiarity.
A bunch of waves that navigates
With particle-like dexterity.

The PB shape can be controlled
Through use of different spectral tweaks,
From saucer flats to sausage links,
Or shapes that in between one seeks.

Saucer PBs may be the key
For solving UFO^{+} events.

I dream about whatever else
The acronym PB portends.

Not only Waves can be PB'd,
PBs can impact daily lore.
Pulse-Burger: A fast-food PB.
Social PB: a Public Bore.

A focused advertising blitz
Can make PB a household word.
From Pill Boxes and Porcelain Baths
To Poetic Babble by a rhyme-conscious nerd.

After I drowsily awake,
These dreamland phantasies are gone.
Forgotten those imagined schemes.
No new PBs to build upon.

Perhaps there'll be another dream
Brought on by my PB addiction.
I hope from that one I'll recall
A clue to new PB prediction.

———————-

** IEEE Antennas and Propagation Magazine, Vol. 46, No. 4, Aug 2004*

$^{+}$ Unidentified flying objects

B. Meeting Organisation: As Meetings toward Bigness Tend, Is Science Best Served by this Trend?

1. The Pro and Con Dilemma*

Not long ago, I had a dream.
I was in flight on Northwestern Air.
Seattle was the final stop,
Majestic landscape, weather fair.

A gorgeous campus came in view.
A flashback made me comprehend
That here convened a conference
Which I was scheduled to attend.

The flashback also brought to mind
The sessions planned for that event.
A multitude of topics there,
But layouts that pursued a trend.

I struggled hard to make a choice
Of topics that I *had* to hear.
Once that was done, the weekly plan
Was such that they don't interfere.

I smiled, relaxed, a job well-done.
I knew my schedule, step by step.
That was the dream. When I awoke,
I felt a booklet on my lap.

While sitting in my chair at home.
The booklet was the program maze
For PIERS symposium Ninety-Five.
At which I looked with eyes aglaze.

In contrast to what I had dreamed,
I saw no regularity
Within the topics that appeared.
I pondered the disparity.

I failed. You wonder: What try next?
An inspiration: Correlate!
Use data processing to set
The inter-session linkage straight.

But, doing this, prevented you
From hearing an important talk.
In desperation, you attempt
To track the speaker's random walk

Through coffee breaks. No luck. What now?
You find you've getting polarized.
Your mood, impatient, renders you
Increasingly antagonized.

Gigantic meetings cause all that.
Frustrating now and oft before.
But you're resigned that come what may
The size expands forever more.

The dream was an impossible dream
With breadth and depth, it's either-or.
To cover both is doomed to fail
You'll try no more to play that score.

———————-

** Extracted from: Not Long Ago, I had a Dream, IEEE Antennas and Propagation Magazine, Vol. 37, No. 5, October 1995 [presented at the Buffet Banquet of the Progress in Electromagnetics Research Symposium (PIERS), 1995, University of Washington, Seattle, Washington, USA, July 24-28, 1995.]*

2. Bigness: California Style*

In June, it's time (no need to guess)
For URSI joint with AP-S.
The meeting site moves back and forth,
From West to East, from South to North.
This time, it is with much ole',
In good old western San Jose'.

The program's packed. There is the trend
(Which organizers will defend)
To raise attendance year to year
So that a surplus will appear.
Some voiced concern, but what's the use:
The schedule's worse than Syracuse.

For those of you who did not know:
The magic number is Eight-Oh
Of sessions in a four-day crush.
If that is reached, no need to blush.
You'll note, alas, they've done it here.
So bear it, grin and persevere.

Faced with a program that's so rich,
You hesitate to make a pitch
For anything you thought was best
Because you have missed all the rest.

If this dilemma causes grief,
Don't fret; there's access to relief.
You make a short tour, sampling wine.
When you return, you're feeling fine.

For those who've traveled from the east,
There's offered a Chuckwagon Feast.
Where you're at home, there is no such chuck.
(Is that a loss, or is it a luck?)

You do join up. Once you've begun,
You can make sure, you're having fun.
By bringing with you your own booze.
Then chuck it all, and take a snooze.

———————-

** Extracted from: Holy Joe, it's San Jose!, IEEE Antennas and Propagation Society Newsletter, August 1989 [presented at the IEEE AP-S Awards Banquet during the IEEE AP-S/URSI International Symposium, San Jose!, California, June 26-30, 1989.]*

3. Bigness: Texas Style*

In each new decade we attempt
Predicting trends from current clues.
From what the ambience portends,
It seems that "merging" will make news.

No matter how the merging's done,
What's merged is bigger than before.
"Bigger is better!" That's the theme
For what the decade holds in store.

Bigness within the USA
Is symbolized by what's out West.
Among those who would bigness flaunt,
The Texans are acknowledged best.

If Texan boldness one would choose
As AP/URSI's meeting site,
Then Dallas is, without a doubt,
The place for doing this just right.

The prairie's gone but Dallas still
Reflects the frontier spirit's urge
Through buildings daringly designed,
With shapes that boldly skyward surge.

Boldness and bigness, side by side.
Big are the stakes and fish you catch.
It's Bigness here and bigness there,
With price tags which that Bigness match.

Attendance here is big as well.
It tops last year's in San Jose!.
The staff are pleased. They can relax.
By coming, we have "made their day".

But session planning causes grief.
You're on a random-looking grid.
So much occurs in parallel.
Now, what to skip and what to hit?

After a day's try you decide
To forego planning in advance.
You breathe a deep sigh of relief
And leave the whole thing up to chance.

Maybe the Bigness trend bestows
On us a blessing that is mixed.
If bigness just means quantity,
Something is wrong that should be fixed.

Where is the quality control
That shows how bigness can perfom?
Where do we see the excellence,
The new ideas, not the norm?

Combined ideas work best when
New unity we can extract.
While starting from diversity,
The final goal may be: Contract.

Perhaps the question for us all,
As we pursue the trend to merge,
Is whether Merging does the trick,
Or whether Merge also needs Purge!

———————-

** Extracted from: A Team for the 90's: Can We Merge Without Purge? [(presented at the IEEE AP-S Awards Banquet of the 1990 International AP-S/URSI Symposium, Dallas, Texas, May 6-11, 1990.]*

4. ICEAA: A Bigness Antidote*

If you work in EMT
And you have the funds to spare,
You have a whole world to see.
There are meetings everywhere.

Choose Japan, England, Brazil,
Sweden, China, USA.
If you haven't had your fill,
Italy has joined the fray.

Grand Torino is the place
Where the eager travelers meet.
Here, the theme is Aerospace,
Which the others did not treat.

Conferences grow and grow
And attending causes stress.
If a profit one can show
Then it's called a big success.
Here, it's different. Size is small.
Although topics are diverse,
One can probably hear all
Of those talks that one prefers.

Aeritalia, Politec,
Put this happ'ning on the road.
Sessions run on double track.
(AP-S, will you take note?)

You can plan it so you will
Find all those whom you would meet.
There's no worry that you steal
Time from items which compete.

Meeting halls are side by side,
Well equipped, with ample space.
Coffee breaks relax the stride,
Chats proceed at leisured pace.

Who would think of luncheon tents
Where in fresh air you can eat?
This, and other fine events,
All present a special treat.

Come what may, Italian charm
Eases all from start to end.
Gestures, humor, smiles disarm
Rigid types who would not bend.

We've enjoyed the meeting's thrust,
Piemonte's wine and food
As we came, so leave we must,
But we leave here, feeling good.

———————-

** Extracted from: ICEAA' 89, IEEE Antennas and Propagation Society Newsletter, December 1989*
[Presented at the Banquet of the International Conference on Electromagnetics in Aerospace Applications (ICEAA), held at the Politecnico, Torino, Italy Sept. 12-15, 1989. The ICEAA meetings have convened biennially in Torino since then.]

5. Thanking the Organizers

a) ICEAA' 97, Torino, Italy*

If the wave pathology caused you some grief,
The sumptuous lunches, with wine, brought relief.

A few pre-meal drinks wiped away all your guilt,
So that you enjoyed your meal to the hilt.

Your world of waves began to look rosy.
Even your wave mistreatment made you feel cozy.

For that we must thank our meeting arrangers.
Wine group therapy made friends out of strangers.

We all felt good, even though waves are crippled,
And pledged stronger effort, not doubled but tripled.

Yet two years from now, renewed guilt progression
Will require another Wine Group Therapy Session.

Grazie Mille!

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** Extracted from: Raves About Waves: We Can't Do Without Them*
IEEE Antennas and Propagation Magazine, Vol. 39, No.5, October 1997 (The theme is the comparison of wave terminology with clinical pathology.)

b) URSI EMT Symposium, '98 Thessaloniki, Greece*

What I take away with me
As I leave this locality
Are impressions of kindness,
Good cheer, hospitality.

I've observed ethnic pride
ln time-honored traditions
That endured through calamities
Under adverse conditions.

Before we depart
We must use this occasion
To acknowledge the team
That did all preparation.

We attendees thank you
For what you have done
To combine in this meeting
Much work and some fun.

I now ask all present
To join in a toast
Extended to those
Who have been our host

To arrange such a meeting
is a Sisyphus task.
You've achieved a success.
That is all we can ask

Many thanks!

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** Extracted from: Traffic in Thessaloniki: The Wave-Particle Dilemma IEEE Antennas and Propagation Magazine, Vol. 40, No.3, June 1998*

c) AGARD Symposium, Toulouse, France, '96*

We leave here with fond memories.
The conference has been a success.
Collaborations were perceived
To make what's sensed less of a mess.

Sensed also: culture and tradition.
Collegiality prevailed.
We met old friends, made new ones too.
That's what AGARD has always entailed.

The AGARD staff, our gracious hosts,
Worked with superb proficiency,
Attending to a million details
With smiles and high efficiency.

I personally owe you thanks,
Because my problems seemed immense.
Deprived of passport+, I felt lost.
You helped and restored my good sense.

From all of us comes this refrain:
Merci! We hope we meet again.
Au Revior

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** Extracted from: The AGARD Symposium in Toulouse, IEEE Antennas and Propagation Magazine, Vol. 38, No.6, December 1996 (dealing with remote sensing)*

+ I was robbed in broad daylight on the street

d) International Conference on Telecommunications (ICT), Istanbul, Turkey, '96*

Istanbul excels for relaxation.
Museums, historic sites, restaurants abound.
Whatever it is that you want to pursue,
It's certain that something can somewhere be found,

The grandiose sights left by royalty past,
Are interlaced with allies that wind
Around buildings and hillsides. Tiny shops on both sides
Offer specialty items that can blow your mind.

The hustle and bustle is hard to describe.
You just join the flow and adapt to the mold.
The ambiance tells what the city is like:
A blending of cultures unique to behold.

For this we owe our gratitude
To those who organized this feat.
It all came off par excellence,
A pattern that others might wish to repeat,

What stays with me most is the friendly concern,
The grace, the sincere hospitality,
Coupled with warmth, with humor and charm,
Because that's the Turk personality.

Again, I say Thank You to my Turkish hosts.
This was an event I shall duly record.
I met former colleagues and students, dear friends.
Friendships through science-that's the global reward.

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** Extracted from: Istanbul, ICT'96*
IEEE Antennas and Propagation Magazine, Vol. 38, No.6, December 1996

C. Branching Out: Other Disciplines, Other Problems

1. Acoustic imaging in the ocean*

All living kind much effort spend
To cope with their environment.
Some use their eyes, some use their nose
To sense where other things repose.
For one group, nothing's more profound
Than to explore the world with sound.
These audio diagnosticians
Go by the name of acousticians.

They regularly meet to check
Whether their sonogram's on track.
With images stored in their packs,
This year, they came to Halifax.
There they combined with ocean types
And each could hear the other's gripes.

A meeting naturally does start
Reviewing present state of art.
What we found out is where it's at:
We cannot hope to match the Bat.

Computer printouts by the reams
Document new inversion schemes.
Each wiggle gets processed with care
To image what is actually there.

The ill-posed problem gives us grief,
It's science laced with strong belief
The lowly bat has no such doubt:
Ill-posed or not, it sorts things out.

After two days of imagery,
The sonic thrusters went to sea.
The ocean bottom, smooth or rough,
Makes tracking sonic signal tough.

Some model modes, some model rays,
Some feel that spectra all portrays.
Then there are those who with dispatch,
Take refuge in the ocean wedge.

If things get messy, randomize.
What's partly smooth, determinize.
You ponder, is it this or that?
And wish you were a lowly bat.

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** Extracted from: Image Tracks at Halifax*
[Presented at the Symposia on Acoustical Imaging and Underwater Acoustics,Halifax, Nova Scotia, 14-18 July 1986.]

2. Noninvasive evaluation of materials*

On Evanston they did converge,
They met so that there might emerge
A picture, clear for all to see,
Why we should work on NDE^{+}.

Some stressed the role of NDT^{++}.
Some others argued NDE
Some questioned what we ought to do
When we prefix the letter "Q".
The Quantity in Q has clout.
The Qualitative Q leaves doubt.

The first few speakers made it plain
That DOD^{+++} needs to sustain
Activities in NDE,
On land, in air, and on the sea.
The audience thus being briefed
Liked what it heard, and felt relieved.

Emphasis focused on the condition
Of strong acoustical emission:
To analyze the sound dispatched
In solid samples being stretched,
And to find methods that relate
The sound to breaks that radiate.
The problem is far from unique.
Does what we find match what we seek?
One has to use a bag of tricks
But, woe, there is no easy fix.
With forward problems well in hand,
One may begin to understand
How models can be put in place
That lead to the inversion trace.

From what emerged, one fact was clear:
Whether your game is compression or shear,
Whether you analyze, measure, apply,
Coming together has helped each to try
Better to know what the others achieved.
It has been useful to so have been briefed.

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* *Extracted from: They Met to Argue NDE [Presented at the banquet of the ONR Symposium on Solid Mechanics Research for QNDE, held at Northwestern University, Evanston, 111, September 18-20, 1985.]*

$^{+}$ *Nondestructive evaluation,* $^{++}$ *Nondestructive testing,* $^{+++}$ *U.S. Department of Defense*

3. Ocean acoustics: Computing at Yale University

a) 1984*

Some came from far, some came from near,
They came to Yale so they could hear
Cheerful and dire premonitions
From underwater acousticians.

This time, Computers is the name
That sets the rules to play the game.
Whether it's spectra, rays or modes
That form the basis of your codes,
Whether you ponder, agonize:
"How fine should I discretize?",
Whether that which makes you frolic
Is a scheme; called "parabolic",
One truth will outshine the rest:
What is fastest, that is best,
If, as well, you have been able
To construct a code that's stable.
Also, as you plan your play,
Do make sure that you don't pay
For the seconds, minutes, hours,
Which your "fast" routine devours.

Meetings like this fill a need.
Acousticians must pay heed
To the science of computing,
To keep errors from polluting
Codes when they are pushed ahead
Into regions yet untread.
What may have been puzzling, strange,
Does get clearer through exchange
Of experience elsewhere gained.
No one's realm is self contained!

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* *Extracted from: GIVE US THIS DAY A STABLE CODE, IEEE Antennas and Propagation Society Newsletter, October 1984*

[Presented at the Ocean Acoustic Workshop, Yale University, August 1-3, 1984.]

b) 1986*

Two years ago we met at Yale
And heard; Computers must prevail
To tell what's simple and profound
In tracking underwater sound.

This year, we met again at Yale
To update our previous tale.
We heard of earlier schemes improved,
Of instabilities removed.
Problems remain, concerning rigor,
But one thing's plain: the codes got bigger.

The scope is larger than before.
The theme this time is to explore
Acoustics in a broader frame,
Though ocean models drive the game.

As codes enlarge and multiply
The need is strong to verify
That each "exact" code is correct
And does not spew out artifact.

To come to grips with this concern.
There is a trend one may discern.
Benchmarks computed with great care
May yield, the numbers to compare.

Choosing the benchmarks causes grief
Because each has his own belief,
And there are those who, with despair,
Turn thumbs down on the whole affair.
Yet, after all have had their say,
The problem has not gone away.
This is a matter for debate
When we meet on a future date.

Somehow, we have to find a track
That keeps computer codes in check.
And as we plunge into the fray,
Let us reflect, and let us pray:

Give us this day a stable code.
Let it print numbers that don't explode.
Let it solve problems that no one has done
Since computations were first begun.
Grant us belief that the code is exact
And that each digit it prints is correct.
Shield us from benchmarks, lest they spoil the dream
Of our grandiose coding scheme.

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** Extracted from: SOUND NUMBERS FOR COMPUTING SOUND*
[Presented at the First IMACS International Symposium on Computational Acoustics, held at Yale University, New Haven, Connecticut, USA, from August 6-8, 1986.]

c) 1989*

Three years since IMACS Eighty-Six.
The acousticians still seek tricks
(Hoping that new ones can be found)
For tracking various kinds of sound.

Computing sound is a fickle game.
Some methods change. More are the same
As what we heard three years ago,
Except that codes just grow and grow.

The keynote talk showed us the trend:
Supercomputing. To this end,
Machines are linked in parallel.
Where this will lead, who dare foretell?

We're all convinced that, come what may,
Large scale computing's here to stay.
The Ultimate: You press a switch
And watch the printout, glitch by glitch.
That being done, now comes the hitch:
Among these glitches, which is which?

You look hard at the printed curve.
Does it portray what we observe?
You dread the effort, spent in vain,
Pseudo-observables to explain.

Are wiggles that your eye detects
A wave, or are they artifacts?
This makes the modelers uptight
And robs them of their sleep at night.

We heard you need not jitter at
Computing that is "literate".
But what's the literacy test
To make Computing function best?

Last time, we argued with much heat
'bout Benchmarks. Will we now repeat
A similarly zealous quest
For "literate computation" test?

The final session's major theme:
Supercomputing's not a dream.
You may do this or may do that,
But Big Computing's where it's at.

Let's dream, but let's take proper care
That dreams do not become nightmare.
And let's recall as we depart:
It's science, but it's laced with Art!

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* *Extracted from: Computing is Super*
[Presented at the Banquet of the 2nd IMACS Symposium on Computational Acoustics, held at Princeton University, Princeton, New Jersey, March 15-17, 1989.]