Dr. Viterbi, Dean Nikias, Colleagues, Ladies and Gentlemen:

This is indeed a great honor for me which I am most happy to accept -- but of course with no illusions -- my academic accomplishments pale compared to Andy's academic accomplishments. I accept this honor in the name of the institution USC which gave so much to me -- in the name of the professors. First and foremost **J.R. Meigs** -- from him I learned the value of originality -- original thinking, in contrast to book learning -- and above all, the importance of Mathematics in Engineering. There is one anecdote that I would like to share with you, which should help illustrate his personality. USC Engineering did not have a Ph.D. program in Engineering in 1950 --so I had to shift to mathematics. There I learned that there is a function which is continuous but has no derivative anywhere. I excitedly related this to Professor Meigs, who immediately responded characteristically -- "That is impossible, Bal, and I will prove it to you." He gave up after one week. He was a remarkable man -- he was also a Golf Coach and a member of the Wilshire Country Club. He took an interest in an ignorant foreign student from a remote village in India -- this is 1949, not 2004 -- and set me on my path. I only wish he were here to share this day with me -- he passed away in 1998.

In mathematics, I worked with **Ralph Phillips** -- one of the great mathematicians of the 20th century. From him I learned Functional Analysis and the importance of being poor -- "You cannot be a great mathematician unless you are poor but honest," he would say. He insisted that I stay in Academia and not go to Industry. And that is where I have stayed essentially all my life.

I could easily go on with many such great professors who make up this great university. There is much in the news now about how much the USC is receiving in endowments, but it GIVES much more and I am just one who can bear witness to this. I am most happy to have a chance to acknowledge my gratitude, my indebtedness. Under the patronage of visionaries like Andy Viterbi and leaders like Dean Max Nikias, the School of Engineering at USC will, I am confident, accelerate its relentless march to the top -- to finally dethrone MIT and become The Number One. I look forward to that, with much glee!

Let me end on that cheerful exciting note thanking you again most sincerely for this great honor.

WHAT IS APPLIED MATHEMATICS?

In contrast to the previous honorees I am a different breed of mathematician. I am an "Applied Mathematician."

Today, Applied Mathematics is an accepted academic specialty area in most Departments of Mathematics -- in the United States, along with Theory or Topology, for example.

What is remarkable is that this would have been unheard of a scant two decades ago. In 1950 Applied Mathematics meant Numerical Analysis and was generally denigrated as second-class mathematics. Claude Shannon's landmark paper on Information Theory was reviewed by the great mathematician J.L. Doob in the Mathematical Reviews and dismissed as some unimportant engineering thermodynamics! The first shock to this complacency of the U.S. mathematics community came when Kolmogorov in the Soviet Union hailed Shannon's work as a great achievement and initiated his own research in the area. The coup de grace however came with Sputnik in 1958 and the revelation that Pontryagin -- revered as pure mathematician of the first rank -- was involved in the mathematics of spacecraft guidance and control.

Then suddenly attitudes started to change. That the mathematics of engineering applications can be just as challenging and respectable as pure mathematics became all too apparent. And at the same time mathematicians began to be employed in large numbers in Industry -- more mathematicians than ever before in all history! The SIAM Journal and a whole host of new journals were launched dedicated to Applications. The universities had to bend with the times and meet the demands of the increasing number of students who wanted to be trained in Applied Mathematics. I owe my own job, in fact, to Kolmogorov and Pontryagin -- "Staff Scientist" in the Space Technology Laboratories in El Segundo, California.

On the other hand, what precisely shall be meant by Applied Mathematics is unclear. In some cases, of course, there is no dispute -- Computation Fluid Dynamics, CFD, for example -- numerical solutions on a digital computer of fluid flow problems where the final product is computational software, is accepted readily as Applied Mathematics -- different though from Numerical Analysis. Incidentally, the Mathematical Reviews had a classification "General Applied Mathematics," which was discontinued after 1972! Now we have separate headings: Information / Communications, System Theory / Control. Optimal Control is under Calculus of Variations and Optimal Control, with a lot of "see also"!

Control Theory is another area generally accepted as Applied Mathematics -- one may think of it as the evolution of Calculus of Variations which has all but disappeared. Here,

however, we have difficulty with the concept of "application" versus "applicability." Much of what appears under Control is not necessarily applied to any particular physical or engineering problem -- even though that is the motivation. A typical example is the "application" of Navier-Stokes Equations -- or more generally, boundary value problems for partial differential equations. None of the theory has ever resulted in any control design -- so far. On the other hand, we have no measure of closeness to a real application before we can classify it as Applied Mathematics or Pure Mathematics.

The perils are closer the closer one is to Application. If the objective is to use mathematics or a math model to answer a particular question of significance arising in Aerodynamics, one would need to be proficient in that area -- becoming thus more of a specialist in that area rather than a mathematician. This takes of course more than a little time. On the other hand, fashions change -- in an area such as hypersonics in which you labored hard and are just beginning to understand, the projects are canceled and a new area takes its place. The point is that to verify your theory you need some experimental facility -- an organization maintaining such a facility -- but this can disappear overnight. So either you change like a chameleon as the fashion changes or you don't get too close to the applications. Which leads to the question: How do you judge accomplishments in Applied Mathematics -- where the number of "deep results" invoked is not an index and the real measure is the impact of the work on the area of application.

It would appear that the term Applied Mathematician is destined to remain vague and there is little one can do about it -- except perhaps to keep following where your tastes lead you -- just as in Pure Mathematics -- and not worry about the classification (except when allocations or positions in different specialties in your department need to be determined!).