

Meeting: 1003, Atlanta, Georgia, GIBBS, AMS Josiah Willard Gibbs Lecture

1003-94-8 **Ingrid Daubechies***, Princeton University, Department of Mathematics & PACM, 218 Fine Hall, Princeton NJ 08544-1000. *The interplay between analysis and algorithms.*

Traditionally, applied mathematicians were interested in problems stemming from physics or other natural sciences. Even to obtain quantitative results, the typical standard procedure would be to first carry out a detailed non-quantitative mathematical analysis; the transition to numerical computation would be done after this analysis. The realization, a long time ago, that this transition has to be done carefully in order to give meaningful results, gave rise to the field of numerical analysis, which has its own mathematically interesting and challenging questions. Nevertheless, there was typically a separation between the mathematical analysis of the problem at hand, and then later the numerical analysis in order to determine good algorithms to computer merical results.

The last few decades have seen the emergence of branches of applied mathematics in which the requirements of the implementation not only drive the numerical analysis at the end, but also play an important role in the earlier stages of studying the problem. This framework generates a different kind of mathematical challenges, stimulated by the requirements of engineering design rather than natural science problems, but equally interesting and possibly far-reaching. The talk will illustrate this by examples borrowed from the speaker's own work as well as of many others; two particular instances are wavelets and analog-to-digital conversion. (Received March 23, 2004)