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The optimal approach regions in SCV

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This talk is devoted to the boundary behaviour — from the viewpoint of almost everywhere convergence through appropriate approach regions — of holomorphic functions, defined on certain bounded domains in \mathbb{C}^n , and subject to appropriate boundedness conditions. Since holomorphic functions are harmonic, this subject depends, in part, on the ample body of results concerning the boundary behaviour of harmonic functions. However, in the setting of several complex variables, holomorphic functions have distinct features which make the subject rather subtle. Indeed, this subject has not yet reached a degree of maturity comparable to that of the boundary behaviour of harmonic functions. The special focus of this talk is the main open problem we see in the area : To wit, it is the issue of determining, for certain smoothly bounded pseudoconvex domains, the *optimal approach regions* along which these functions converge almost everywhere to their boundary values. These *optimal approach regions* turn out to depend on the domain, contrary to the case of harmonic function theory. In the background there lie other open problems. For example : to allow domains in \mathbb{C}^n with the most general bounding hypersurface for which the first problem is meaningful : In other words, one would like to substantially relax the smoothness assumptions on the boundary. In the context of potential theory, these problems have been given a fairly satisfactory answer : For example, our understanding of the boundary behaviour of harmonic functions goes well beyond Liapounoff domains and includes the so-called NTA domains, whose boundary may be nowhere differentiable (for example : the von Koch snowflake is an NTA domain but it is not a Lipschitz domain).

This is part of a joint work with Steven Krantz.

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