<u>Harmonic mappings, complex function theory and minimal surfaces</u>

Daoud Bshouty

A Harmonic Mapping in R^2 is a solution of Laplace equation in the complex plane, i.e. u(x,y)+i v(x,y) where u and v are harmonic functions. When u and v are related by the Cauchy-Riemann equations, it becomes analytic. Minimal Surface in R^3 are solutions of nonlinear elliptic real PDEs. However, a one to one relation exists between harmonic mappings and minimal surfaces and luckily enough complex analysis is closely related to harmonic mappings. Since 1984 complex analysis has played a major role in advancing our knowledge in minimal surfaces.

We study harmonic polynomials, the geometry of harmonic mappings versus the analytic ones, and their implications on major issues in minimal surfaces.

the research involves theoretical and experimental study often of different shapes of harmonic mappings and their behavior.