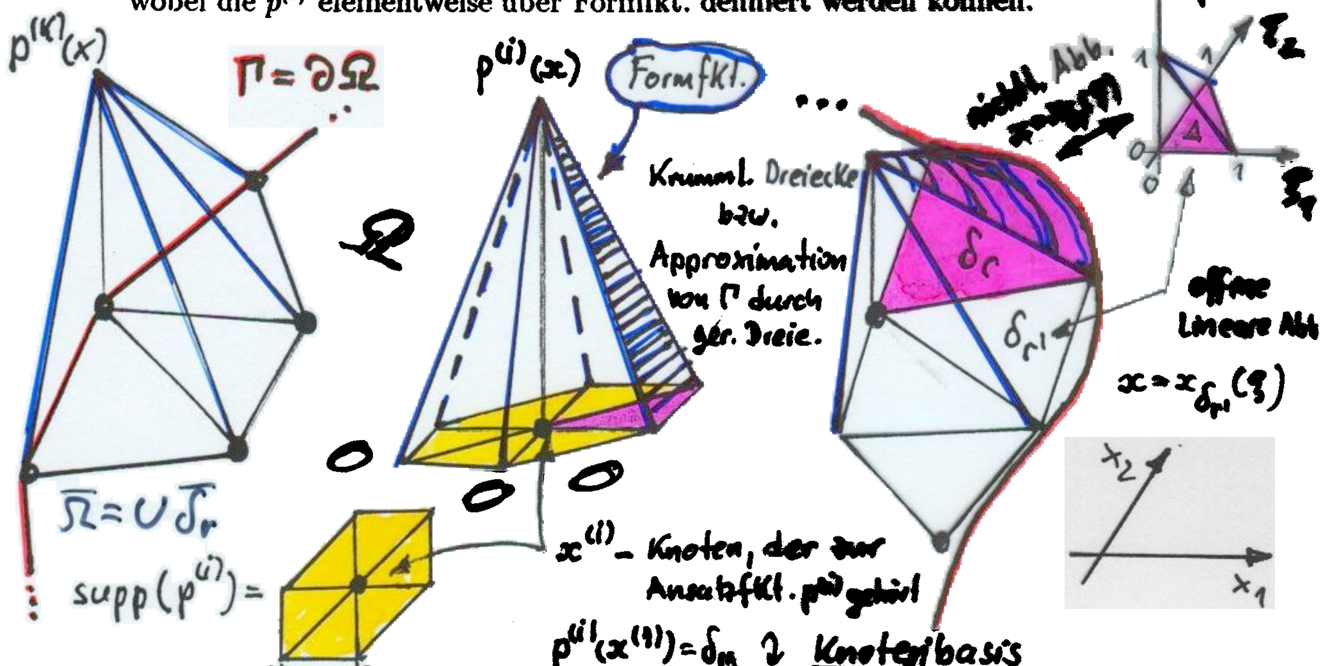
- <u>Idee:</u> Die grundlegende Idee zur prinzipiellen Überwindung der Hauptschwierigkeiten des <u>klassischen</u> Galerkin-Verfahrens (d.h. Verwendung von Ansatzfkt. mit globalen Trägern: z.B. Polynomen) stammt von Richard COURANT (1943):

"Variational Methods for the Solution of Problems
of Equilibrium and Vibrations"
Bull. Amer. Math. Soc., 49 (1943), 1-23.

> "If the variational problems contain derivatives not higher than the first order the method of finite difference can be subordinated to the Rayleigh-Ritz method by considering in the competition only functions ϕ which are linear in the meshes of a sub-division of our net into triangles formed by diagonals of the squares of the net. For such polyhedral functions the integrals become sums expressed by the finite number of values of ϕ in the net-points and the minimum conditions become our difference equations. Such an interpretation suggests a *wide generalization* which provides great flexibility and seems to have considerable practical value. Instead of starting with a quadratic or rectangular net we may consider from the outset any polyhedral surfaces with edges over an *arbitrarily chosen* (preferably triangular) *net.* Our integrals again become finite sums, and the minimum condition will be equations for the values of ϕ in the net-points. While these equations seem less simple than the original difference equations, we gain the enormous advantage of better adaptability to the data of the problem and thus we can often obtain good results with very little numerical calculation."

und wurde in der Mitte der 50-iger Jahre von Ingenieuren (J.H. Argyris, 1954 ff, M.J. Turner, R.J. Clough, H.C. Martin, L.J. Topp 1956, u.a. ...) neu entdeckt:

$\Rightarrow$ Verwendung von Ansatzfkt. (Testfkt.) $p^{(i)} = p^{(i)}(x)$ mit lokalen Trägern, wobei die $p^{(i)}$ elementweise über Formfkt. definiert werden können.



$$\Rightarrow u_h(x) = \sum_{i \in \bar\omega_h} u^{(i)} p^{(i)}(x) \in W_2^1(\Omega) \cap C^0(\bar\Omega)$$

(C°-Elemente!)