Oral Presentation

REFLECTIONS ABOUT CHANGING THE TEACHING OF GEOMETRY IN GRADUATION

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In Brazil, and the federal University of Rio de Janeiro in particular, the courses of license split the teaching of the geometry in two, on the one hand Euclidean and non-Euclidean geometry presenting an axiomatic and synthetic approach (in the tradition respectively of Hilbert and Boliai), on the other hand an analytical approach, primarily affin euclidean space definite starting from a normalized vector space. This dichotomy is found also in secondary education where one teaches one year the geometry according to implicit axiomatic and the cases of congruences and similarities of the triangles, and another year analytical geometry.

This division of course has historical reasons which go up with the opposition between synthetic and analytical geometry in the 19th century until the work of Klein and Poincaré, opposition which is found in the handbooks of the 19th century when synthetic geometry and analytical geometry constituted two separate disciplines.

To change this practice a reflection on two levels is required. 1) theoretical: how to present the essential notions of the two points of view so as to constitute only one discipline, 2) didactic: how to determine a unifying element which makes it possible to decline the concepts and their applications.

With regard to the theory, we think of finding a solution in the presentation of the model of affin space checking the axioms of incidence and order, and define a norm checking the axioms of congruence. Another aspect of the vector calculus related to affin space closely connected is to allow barycentric calculation and to deal with by this skew the problems of incidence and to introduce the concept of convexity. The barycentric co-ordinates are besides a first example of homogeneous coordinates, true bridge worm the projective geometry.

At the didactic level, the essential leading element is the traditional presentation of the problems as those treated in the small book of Coxeter (Geometry revisited), or more recently few problems of Geometry revealed of Berger, all with the perspective defended today by Daniel Perrin in various writing and courses. The perspective is not only to solve this problems in one way but also, that is the most important, to present a multiplicity of solutions for every problem. This multiplicity shows that we are not dividing mathematics into little bits (synthetic, analytic, vectorial) but we are teaching only one thing, mathematics.

Texts presented ind this workshop:

Brazilian mathematic programs of the secondary level.

Brazilian cursus of geometry at the federal University of Rio de Janeiro.

Some French and English texts books in 19th century.

Text of the French Kahane French Commission (2000) de Daniel Perrin.

Few texts of Daniel Perrin (in his site)

Few classic problems which any future teacher cannot ignore, and didactical interest of these problems.