

A Gentle Introduction to Geometric Modelling via Dynamic Geometry

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Systems of dynamic and interactive geometry represents today a powerful tool for making teaching and learning process more effective and more efficient. However, a majority of computer-aided learning and teaching activities for geometry courses is oriented mainly on basic problems of elementary, and secondary schools. In this contribution, we will thoroughly discuss using variational and dynamic geometry software in teaching higher-level geometry in courses for mechanical, civil (and other) engineering. We will emphasize a propedeutic role of these systems for solving not only planar questions but also for more complicated spatial constructions originated in practical engineering problems, i.e., dealing with curves and surfaces and derived objects. In particular, we will demonstrate an application of software Cabri Geometry and GeoGebra as suitable tools for the first steps towards geometric modeling and hence also towards CAD/CAM. This approach will be demonstrated on several examples (e.g. de Casteljaeu algorithm; construction of hodographs of curves; solving intersections of surfaces; modeling developable, rotational, helical, envelope and other surfaces; and further problems related to fundamental objects of geometric modeling).