MATLAB AS A TOOL FOR EXPERIMENTAL MATHEMATICS

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Active methodological approach of "Own student' Discoveries" in Mathematics and Programming is suggested here. Both disciplines are to be in association to reach souls of recent students. Programming the problem in focus and, then, experimenting with it is to precede to strict proofs.

Math and Programming for contemporary generation

This youth generation is completely different with regard to elder teacher's Generation: it is more advanced in using Internet and computer but very weak in fundamental disciplines like Math. It means, "active" learning fits best for their education and an "Easy Programming" is the proper way to their souls. "Which Programming is easiest" and how to employ it for learning Mathematics is discussed here.

First, we demonstrate a few algorithms that inspire to education first year students and suggest some virtual experiments to them. These algorithms link Math and Programing. However, how to program in order not to drown in technical details but focus to mathematics? We compare some mathematical environments (Mathematica, MathCAD etc.) and programming languages (C, Java, Python etc.) and conclude that MATLAB fits best. Our experience shows that students become enthusiasts in both sciences. This is a challenge to educators to fix it for long years.

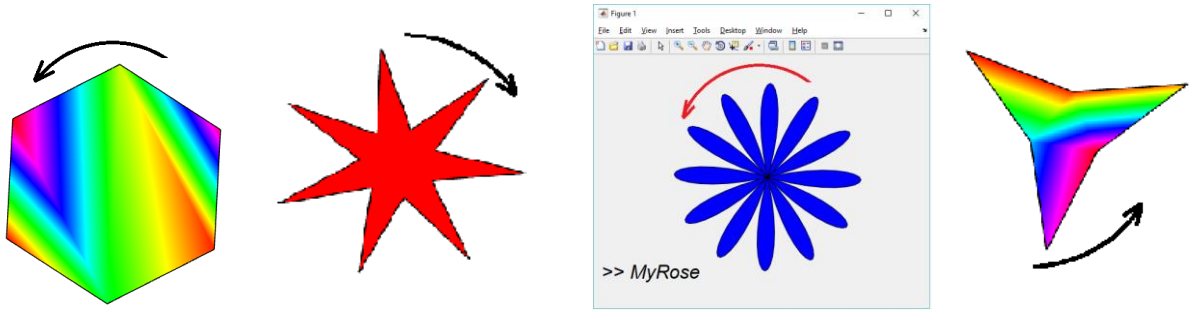

Fig. 1. Some algorithms to inspire to education: experiment with shape, color, rotation and more to understand both Math and Programming

Mathematics and Programming in curriculum

MATLAB is widely used for science. It includes all the recent programming features to master also this educational discipline itself. We suggest, however, to implement these student' knowledges in Mathematics as well to demonstrate complex facts visually, to experiment with them prior to their strict proof. Their "Own Discoveries" on the way (1) programming the problem in focus, (2) experimenting with this tool guaranty best success. Next, MATLAB will be useful for "experimental" learning all the consequent curriculum disciplines that is going to be demonstrated. Finally, such approach will certainly be implemented in their Term and Diploma works, especially in engineering specialties.

References

Gayev Ye. (2021) Why MATLAB? Compare to Mathematica and Python. 2nd int. Conf. "MATLAB and computer calculations in education, science and engineering", April 24 – 28, Kyiv. (in Ukrainian)

Gayev Ye.A. e.a. (2006) MATLAB for Math and Programming. Textbook. - 101 pp. http://www.twirpx.com/file/1707755/

Gayev Ye.A. e.a. (2017, 2019) Modern Programming for Engineers. Two parts. – 300 pp. (in Ukrainian)