Review of: "Technological Tools to Teach the Idea of Optimality"

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Potential competing interests: No potential competing interests to declare.

The paper deals with the analysis of optimization problems and shows their solutions using selected examples. As far as the concept of the paper is concerned, however, its title is much more general than its content. After a brief characterization of the optimization problems, the text focuses exclusively on one particular software tool, FeliX (and GGBFeliX, with an explanation of their differences), designed for geometric applications, showing its algebraic context and its control by means of examples. Thus, although it is not a new method or mathematical model, the information about the on-line version of the program and the explanation of its functions, including some of the textual directives used to specify the problem, are valuable to the user.

Comments:

In the characterization of the optimization domains on page 2, it would be useful to add combinatorial optimization, which is related to NP-hard and NP-complete problems that, in simplified terms, have exponential time complexity and for larger instances of the problem, an optimal solution cannot be found in the available time and a suitable heuristic method must be used to determine an approximation of the optimal solution.

Fig. 3 shows the Fermat-Torricelli point of a triangle. The location of the point D in the centre of gravity of triangle ABC is also known as the solution of the *Euclidean Steiner Tree Problem* for 3 points in the plane. This is a special case of the general Steiner Tree Problem in the Euclidean plane, where the goal is to connect n points in the plane (called *terminals*) so that the sum of the edge lengths is minimal. It is proved that at most n–2 auxiliary points (*Steiner points*) are needed to connect the n points, which are not among the terminals. Thus, for a problem with 3 terminals, at most one Steiner point is needed. However, if one of the angles of the triangle formed by joining a triplet of points has an angle of at least 120°, then the shortest join of this triplet is given by two edges without a Steiner point; otherwise, a Steiner point is needed which lies in the centre of gravity of the triangle, and all the terminals are connected to it.

Format:

In Figure 5, the center points F, G, H, I overlap with the segment labels s1, s2, s3, s4.

Letter symbols of variables in free text should be written in the same way as in mathematical notation, i.e., in italics.

Considering the practical importance of the paper, I recommend publishing it after minor modifications and additions.