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Analysis and construction of rational curve parametrizations with non-ordinary singularities

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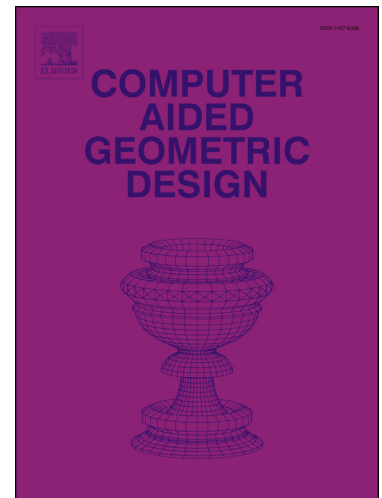
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## Highlights

- In this paper, we provide a method that allows to construct parametric curves having (or not) non-ordinary singularities and having (or not) neighboring points. From this approach, we present an algorithm that outputs a parametrization of a rational curve having singularities at some given input points. In this algorithm, the singular point  $P$ , the order of  $P$ , the parameters corresponding to  $P$ , the multiplicity of each parameter, as well as singularities in the first neighborhood of  $P$ , are fixed as the input of the problem. As output of the algorithm, we obtain a rational curve defined parametrically with the singularities fixed in the input. Thus, the algorithm presented is very useful for constructing examples related to singularities, and then, the results in this paper are very important in the frame of practical designing of engineering and modeling applications. The method presented is based on the characterization of non-ordinary singularities and neighboring points by means of linear equations involving the given parametrization. Although the techniques used in the paper are not novel, most existing textbooks explain the problem dealt in this paper in the language of implicit equations. Here, we translate every detail of the definitions and resolutions into the language of parametric equations, which are quite helpful to CAGD.

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