
Of Geometry in Computing

Mathieu Desbrun^{*1}

¹LIX – LIX CNRS, Ecole Polytechnique, Institut Polytechnique de Paris, L’Institut National de Recherche en Informatique et en Automatique (INRIA) – France

Résumé

This talk will discuss the "unreasonable effectiveness" of geometry in computing. Indeed, it has been repeatedly noted in computational science that the quality of computing tools ultimately boil down to properties of a fundamentally geometric or topological nature. This talk will describe a brief overview of our approach to computing through the lens of geometry to offer a versatile and efficient toolbox for a variety of applications, from shape processing to tangent vector field editing, and from non-linear dimensionality reduction to matrix preconditioners. We will point out how a strong grasp of classical differential geometry paired with a good understanding of the typical computational constraints in research and industry can bring forth novel theoretical and practical foundations for general-purpose computations. The importance of preserving differential geometric notions in the discrete setting will be a recurring theme throughout the talk to demonstrate the value of a geometric approach to computations.

^{*}Intervenant