

Geometric integration of mechanical systems and applications to optimal control

David Martin de Diego ¹,

¹ Institute of Mathematical Sciences, Spanish National Research Council, Spain

In talk we will review the classical notion of retraction map traditionally used in optimization theory, interpolation etc. We will see that this notion is a powerful tool to construct different geometric integrators for mechanical systems using appropriate lifts of retraction maps to the corresponding phase spaces. As a result, a wide range of numerical methods on manifolds are recovered and canonically constructed by using different types of retraction maps and simple operations of symplectic geometry. Moreover, we will study new applications of this construction to optimal control problems and systems reduced by symmetries.