Affine invariance in numerical analysis: the case of B-Series

Olivier Verdier

Bergen University College, Norway

Invariance with respect to scalings (changes of units), rotations and shear have played a major role in numerical analysis at large. Examples include optimisation, finite element spaces, sampling, and ODE integration. In addition, it turns out that at least one other property is fundamental: if two independent systems are bundled together, then the algorithm at hand should automatically solve those systems independently, without introducing any artificial coupling. I will give an overview of invariance in numerical analysis, and present a recent result which characterises B-Series as the affine invariant, and non-coupling, integrators.