The physical nature of non-linear composable elasticity

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In this presentation an introduction will be given of a number of contributions which have appeared in the Journal of Geometry and Physics, Physics of Fluids, Journal of Computational Physics and Journal of Nonlinear Science, showing what the real coordinate invariant description is of continuous media in general and of elasticity in particular. It will be shown that in order to properly talk about elasticity in a general and composable setting, mathematical objects called tensor valued forms are needed as well as the realisation that matter and space need to be structurally considered as separate entities. Due to the restricted time this will be presented as an introduction of the concepts as intuitively as possible and placed in the context in which they have been researched, the ERC AdG project Portwings in which composability of elasticity and fluid dynamics for a flapping robotic bird have been successfully studied.