

## A differential approach to Maxwell-Cremona liftings

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**Abstract:** In 1864, James Clerk Maxwell introduced a link between self-stressed frameworks in the plane and piecewise linear liftings to 3-space. This connection has found numerous applications in areas such as rigidity theory, discrete and computational geometry, control theory and structural engineering. While there are some generalisations of this theory to liftings of  $d$ -complexes in  $d$ -space, extensions for liftings of frameworks in  $d$ -space for  $d$  at least 3 have been missing. In this talk we introduce differential liftings on general graphs using differential forms associated with the elements of the homotopy groups of the complements to the frameworks. Such liftings play the role of integrands for the classical notion of liftings for planar frameworks. These differential liftings have a natural extension to self-stressed frameworks in higher dimensions. As a result we generalise the notion of classical liftings to both graphs and multidimensional  $k$ -complexes in  $d$ -space ( $k=2, \dots, d$ ). This is joint work with Oleg Karpenkov, Fatemeh Mohammadi and Christian Mueller.