

*Engineering Applications*

**Summary**

At this point in the Summer School, students will have been exposed to the basics of Geometric Algebra (GA), transformations in GA, linear functions mapping multivectors to multivectors, the conformal model (CGA) and calculus in a GA framework. There will also have been a chance to get hands-on experience with symbolic GA manipulations. This session will attempt to draw on much of this material and present applications in engineering relevant to the theory.

As an application of rigid body dynamics using GA, we will look at the topic of *inertial navigation*, where accelerometer and gyroscope readings are combined to produce position and velocity information, showing that many standard algorithms are better performed in bivector space. *Computer vision and computer graphics* are some of the most active topics in engineering GA research. We will look at how projective geometry and the geometry of multiple cameras can be nicely formulated within GA, and how CGA can simplify many operations in computer graphics (for example, bouncing lines/rays off triangular facets in space). As an example of functional differentiation, we will take a simplified *signal processing problem* involving the estimation of an optimal matrix, which has an imposed given structure. Finally, we will briefly outline how GA has been applied in the fields of image processing, acoustic fluids and structural mechanics.