Chapter 13
Conclusion

The aim of this book was to take the reader through the important ideas and mathematical techniques associated with rotation transforms. I mentioned that I would not be too pedantic about mathematical terminology and would not swamp the reader with high-level concepts and axioms that pervade the real world of mathematics. My prime objective was to make the reader confident and comfortable with complex numbers, vectors, matrices, quaternions and bivector rotors. I knew that this was a challenge, but as they all share rotation as a common thread, hopefully, this has not been too onerous for the reader.

The worked examples will provide the reader with real problems to explore. As far as I know, they all produce correct results. But that was not always the case, as it is so easy to switch a sign during an algebraic expansion that creates a false result. However, repeated examination eventually leads one to the mistake, and the correct answer emerges so naturally.

The real challenge for the reader is the next level. There are some excellent books, technical papers and websites that introduce more advanced topics such as the B-spline interpolation of quaternions, the kinematics of moving frames, exponential rotors and conformal geometry. Hopefully, the contents of this book has prepared the reader for such journeys.

What I have tried to show throughout the previous dozen chapters is that rotations are about sines and cosines, which are ratios associated with a line sweeping the unit circle. These, in turn, can be expressed in various identities, especially half-angle identities.

Imaginary quantities also seem to play an important role in rotations, and it is just as well that they exist otherwise life would be extremely difficult! We have seen that complex numbers, quaternions and bivector rotors all include imaginary quantities, and at the end of the day, they just seem to be different ways of controlling sines and cosines. I am certain that you now appreciate that quaternions are just one of four possible algebras that require an n-square identity, and that they are closely related to Clifford algebra. Which one is best for computer graphics? I don't know. But I am certain that if you attempt to implement these ideas, you will discover the answer.

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