

Dynamic applications of the parallelogram law, and some generalizations of the Pythagoras' theorem

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The simplest form of the parallelogram law belongs to elementary geometry. It states that the sum of the squares of the lengths of the four sides of a parallelogram equals the sum of the squares of the lengths of the two diagonals. This relationship can be understood as a relationship between the lengths of so-called related triangles. The related triangles can be moved out of the parallelogram.

The first part of the paper focuses on exploring geometric situations in which we can find such triangles.

The second part will demonstrate simple dynamic derivation Ptolemy's inequality, which for the rectangle is reduced to the Pythagorean theorem, and a dynamic form of the Euclid generalization of the Pythagorean theorem.