Finding Rainbow Triangles with Flag Algebra

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A gentle introduction to Flag Algebras, a method for finding new bounds for extremal graph problems. We explain the basic method of flag algebra, and apply it to a colorful version of Mantel's Theorem. Let G_1, G_2, and G_3 be three graphs on the same vertex set of n vertices, each with at least m edges, such that no three vertices span a triangle with one edge from each graph. We find the maximum value of m, and completely characterize the extremal examples when n is large, answering a recent question by Aharoni.