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The Length and Depth of Real Algebraic Groups

Let G be a connected real algebraic group. An unrefinable chain of G is a chain of subgroups $G = G_0 > G_1 > ... > G_t = 1$ where each G_i is a maximal connected real subgroup of G_{i-1}. The maximal (respectively, minimal) length of such an unrefinable chain is called the length (respectively, depth) of G. We give a precise formula for the length of G, which generalises results of Burness, Liebeck and Shalev on complex algebraic groups and also on compact Lie groups. If G is simple then we bound the depth of G above and below, and in many cases we compute the exact value. In particular, the depth of any simple G is at most 9.

Keywords: Length, depth, real algebraic groups.

MSC: 20G20.