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An Asymptotic Result on the A-Component in the Iwasawa Decomposition

Let G be a connected noncompact semisimple Lie group. For each $v', v, g \in G$, we prove that

$$\lim_{t\to\infty} [a(v'g^t v)]^{1/t} = s^{-1} \cdot b(g),$$

where $a(g)$ denotes the a-component in the Iwasawa decomposition of $g = kan$ and $b(g) \in A_+$ denotes the unique element that is conjugate to the hyperbolic component h in the complete multiplicative Jordan decomposition of $g = ehu$. The element s in the Weyl group of (G, A) is determined by $yv \in G$ (not unique in general) in such a way that $yv \in N^- m_s MAN$, where $yhy^{-1} = b(g)$ and $G = \cup_{s\in W} N^- m_s MAN$ is the Bruhat decomposition of G.

Keywords: Iwasawa decomposition, complete multiplicative Jordan decomposition, Bruhat decomposition, a-component.

MSC: 22E46; 22E30