Primitivity of group rings of torsion-free non-elementary hyperbolic groups

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Let G be a torsion-free non-elementary hyperbolic group. The well-known "big powers" property of hyperbolic groups allows one to "pad" a finite sequence of elements of G to obtain an element guaranteed to be nontrivial in G. We show how this immediately implies Nishinaka's Property (*), proving that the group ring KG is primitive for any field K and any torsion-free non-elementary hyperbolic group G.