Critical exponents for a family of normal subgroups, Kazhdan distance and the spectrum of transfer operators

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Abstract

The critical exponent of a discrete group of isometries of a suitably negatively curved space quantifies the rate of exponential growth of the orbit of an arbitrary point in the space under the action of the group. We fix a cocompact (or convex cocompact) group Γ and ask how the critical exponent behaves for any family of normal subgroups of Γ. We find that the critical exponent has the same coarse behaviour as the Kazhdan distance of certain unitary representations of Γ given by the normal subgroups. On the way to proving this is we establish similar statements for the spectrum of transfer operators associated to group extensions of a subshift of finite type.