Non-universal anomalous diffusion and adsorption in asymmetric random walks on hierarchical networks[1] LAUREN BALL, ALFRED FARRIS, STEFAN BOETTCHER, Emory University — We study an asymmetric random walk on a network consisting of a one-dimensional line and hierarchy of small-world links, called the Hanoi network.[2] Walkers are biased along the one-dimensional line, and move in the opposite direction only along the long-range links with a probability p. We study the mean-square displacement $\langle r^2 \rangle \sim t^{\frac{2}{d_w}}$ and find that the anomalous diffusion exponent d_w depends on p. The behavior ranges from ballistic motion $(d_w(p=0)=1)$ to an adsorbed state $(d_w(p_c)=\infty)$. This phase transition to the adsorbed state occurs at a finite $p_c < 1$. We use simulations and the renormalization group to determine these properties.

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