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**Joanna M Furno\*** (jfurno@wesleyan.edu). *Approximations and digraph representations of  $p$ -adic transformations.*

A transformation on the  $p$ -adic integers is a  $p$ -adic transitive isometry if it is an isometry that permutes the balls of radius  $p^{-n}$  in a cycle, for all  $n \in \mathbb{N}$ . We use cyclic approximations of  $p$ -adic transitive isometries to prove results on spectrum and entropy of the transformations with respect to Haar measure. A  $p$ -adic transitive isometry and its  $n$ th cyclic approximation induce the same digraph representation on balls of radius  $p^{-n}$ . We give an algorithm to label the digraph for translation by rational numbers in  $\mathbb{Z}_p$ , and we discuss a link between the algorithm and number theory. (Received August 13, 2014)