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**N. Jonoska\*** (jonoska@mail.usf.edu), **M. Krajcevski** and **G. McColm**. *Crystallographic Structures and Intersection Hierarchy of Context-free Languages*. Preliminary report.

We establish a relationship between periodic graphs representing crystallographic structures and an infinite hierarchy of intersection languages  $\mathcal{DCL}_d$ ,  $d = 0, 1, 2, \dots$ , within the intersection classes of deterministic context-free languages. An intersection of  $d$  languages in  $\mathcal{DCL}_1$  defines  $\mathcal{DCL}_d$ . A crystallographic structure can be represented by a periodic (di)graph, i.e., a graph whose group of automorphisms has a translational subgroup of finite index acting freely on a unit cell of the structure. We prove that there is a one-to-one correspondence between sets of walks starting and ending in the same unit of a  $d$ -dimensional periodic (di)graph and the class of languages in  $\mathcal{DCL}_d$ . The proof uses the following result: given a digraph  $\Delta$  and a group  $G$  there is a unique digraph  $\Gamma$  such that  $G \leq \text{Aut } \Gamma$  and  $\Gamma/G \cong \Delta$ . (Received January 27, 2014)