

THE C^* -ALGEBRAS OF ARBITRARY GRAPHS

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ABSTRACT. To an arbitrary directed graph we associate a row-finite directed graph whose C^* -algebra contains the C^* -algebra of the original graph as a full corner. This allows us to generalize results for C^* -algebras of row-finite graphs to C^* -algebras of arbitrary graphs: the uniqueness theorem, simplicity criteria, descriptions of the ideals and primitive ideal space, and conditions under which a graph algebra is AF and purely infinite. Our proofs require only standard Cuntz-Krieger techniques and do not rely on powerful constructs such as groupoids, Exel-Laca algebras, or Cuntz-Pimsner algebras.

1. Introduction. Since they were first introduced in 1947 [17], C^* -algebras have become important tools for mathematicians working in many areas. Because of the immensity of the class of all C^* -algebras, however, it has become important to identify and study special types of C^* -algebras. These special types of C^* -algebras (e.g., AF-algebras, Bunce-Deddens algebras, AH-algebras, irrational rotation algebras, group C^* -algebras, and various crossed products) have provided great insight into the behavior of more general C^* -algebras. In fact, it is fair to say that much of the development of operator algebras in the last 20 years has been based on a careful study of these special classes.

One important and very natural class of C^* -algebras comes from considering C^* -algebras generated by partial isometries. There are a variety of ways to construct these C^* -algebras, but typically any such construction will involve having the partial isometries satisfy relations that describe how their initial and final spaces are related. Furthermore, one finds that in practice it is convenient to have an object (e.g., a matrix, a graph, etc.) that summarizes these relations.

In 1977 Cuntz introduced a class of C^* -algebras that became known as Cuntz algebras [4]. For each $n = 2, 3, \dots, \infty$ the Cuntz algebra \mathcal{O}_n is generated by n isometries satisfying certain relations. The Cuntz algebras were important in the development of C^* -algebras because

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