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An operator system view on regular quantum graphs

Quantizing aspects of classical graphs has led to various equivalent definitions of a quantum graph. One definition comes from quantizing the edge relation, which leads to a specific operator system. Under certain circumstances, this can be viewed as a quantization of a classical confusability graph. Another approach involves quantizing the adjacency matrix, which leads to a concept called the quantum adjacency operator. We give an overview of the different notions of quantum graphs and discuss how to translate between them. Then, using the quantum adjacency operator perspective, we introduce a quantum notion of regularity. We show that this leads to a basis condition on the corresponding operator system for quantum graphs on full matrix algebras.