

On short exact sequences of Kronecker modules

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Abstract

Let $K : 1 \begin{array}{c} \xleftarrow{\alpha} \\ \xleftarrow{\beta} \end{array} 2$ be the *Kronecker quiver* and κ an arbitrary field.

The path algebra κK over the Kronecker quiver is the *Kronecker algebra*. We will consider the category of finite dimensional right modules over this algebra, the category of *Kronecker modules* (a Krull–Schmidt category). The category of Kronecker modules can be identified with the category of the finite dimensional κ -representations of the Kronecker quiver.

In our talk we deal with the explicit description of the middle terms in various short exact sequences of Kronecker modules, revealing some interesting combinatorial properties. Kronecker modules correspond to *matrix pencils* in linear algebra and we show how our results can lead to the explicit solution (in some special cases for now) of the *matrix subpencil problem*, an important open problem with applications in control theory and engineering.

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