Rings & Wings

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Title: Infinite Matrix Rings: Surprisingly, Lots of Structure!

Abstract: For an infinite cardinal I and associative unital ring R, the obviously-defined "I by I matrices over R" make sense. But this set of matrices does not admit a ring structure using the standard multiplication of matrices, as this process would yield the sum of infinitely many nonzero elements of R. However, by restricting the I by I matrices under consideration, one can define a number of different "infinite matrix rings over R", many of them arising quite naturally.

At first glance these infinite matrix rings seem quite mysterious, and perhaps too wildly large to say anything intelligent about. But first glances can be deceiving! We'll talk about an elegant result (due to Vic Camillo in the early 1980s) that opened up a number of lines of investigation into these rings. We'll then look at some natural relationships between specified types of infinite matrix rings over two rings R and S, and the rings R and S themselves.