

SEMINARIO DE GEOMETRÍA ALGEBRAICA

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Impartirá la conferencia

Homotopy techniques for tensor decomposition and perfect identifiability

Resumen.

Given a tensor (hypermatrix), we would like to express it in the simplest possible way as the sum of the smallest number of decomposable (or rank-1) tensors. While there are many algorithms that attempt to accomplish this task, it is known to be a very difficult problem. Moreover, such a decomposition may not be unique. When a generic tensor of a given format has a unique decomposition, we say that tensors of that format are "generically identifiable."

We propose a new method to find tensor decompositions via homotopy continuation. This technique allows us to find all decompositions of a given tensor (at least for relatively small tensors). Our experiments yielded a surprise - we found two new tensor formats, $(3, 4, 5)$ and $(2, 2, 2, 3)$, where the generic tensor has a unique decomposition. Using techniques from algebraic geometry, we prove that these cases are indeed "generically identifiable."

This is joint work with J. Hauenstein, G. Ottaviani and A. Sommese.