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Diagonal invariants of the symmetric group and products of linear forms

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Abstract

Following Brill and his student Junker (XIXth century) and more recently John Dalbec, we consider the map that sends an unordered collection of n linear forms in r variables to their product. This is an injective polynomial map. Is this map an embedding? What are the equations of the image (the subvariety of decomposable forms)?

Using the diagonal invariants of the symmetric group, I will answer to the first question (completing a partial answer by A. Neeman), and explain how to ask “reasonably” to the computer to compute a Gröbner basis for the ideal of the subvariety of the decomposable forms, for the small values of n and r . These computations allow to support or disprove some conjectures about these ideals.