

## Polynomial Coefficients of Elimination Results from a system of Classical Mechanics

*Jonathan Tot*<sup>1</sup>, *Robert H. Lewis*<sup>2</sup>

[jonathan.tot@dal.ca]

<sup>1</sup> Department of Mathematics and Statistics, Dalhousie University, Halifax, NS

<sup>2</sup> Mathematics Department, Fordham University, Bronx, NY

In work that is being prepared for publication, we study the static solutions of a rotating double pendulum: a double pendulum modeled as constructed from physical pendula, or three-dimensional rigid bodies, and made to rotate uniformly about the vertical axis through the fixed inner pivot. Resultants can be computed to produce bifurcation diagrams: plots of equilibrium positions against a control parameter. Bifurcation can also be described by a system of polynomial equations. Variables corresponding to an equilibrium configuration can be eliminated from the system, producing a polynomial condition on the parameter space; the model exhibits bifurcation for parameter values which are roots of the resultant. This and other related resultants have been computed using `DixonEDF`[2], an algorithm which extracts a factorization of the Dixon resultant, and which is implemented in the CAS *Fermat*. In this presentation, we will also present several observations of novel patterns observed in the coefficient arrays of the large polynomials produced by these computations.

### Keywords

Polynomial System Solving, Elimination, Resultants, Discriminant, Polynomial Coefficients

### References

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