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**Rational Function Vector Recovery with Error Correction by Parametric Linear System Solving and Cabay Termination**

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We would like to recover a vector of rational functions, in a single parameter *u* over a field *K*, from as few evaluations of the vector as possible, given that no more than *E* evaluations are wrong. Our vector of rational functions,

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has *g(u)* monic and GCD (*f1, f2, …,fn, g*) = 1. We consider solving systems of the form *A*(*u*)x = *b*(*u*), where the entries are polynomials in *u* over *K*, and *A*(*u*) has full rank. We prove that we can solve such a system as long as on enough evaluations we have a scalar system, possibly unrelated to the evaluated system, that has as its solution, the evaluated solution of the system. Our algorithm can be specialized to recovering *f* (*u*) */g* (*u*) from its evaluations.

We ignore evaluations that cause a drop in rank and use error correcting code techniques to find the solution. Our initial algorithm is a generalization of Welch/Berlekamp decoding of algebraic Reed/Solomon error correcting codes. We describe when it is possible to use fewer evaluations than Welch/Berlekamp*.* Our algorithms work even if some evaluations are roots of the denominator. We also describe a general early termination algorithm that allows us to compute the solution from fewer evaluations if our degree bounds grossly overestimate the actual degrees.