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Hermite Interpolation With Error Correction

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Univariate polynomial interpolation with error correction is the methodology of the 1960 Reed-Solomon algebraic error correction code. Univariate polynomial Hermite interpolation with error correction, which fits values and values of derivatives, is the 1997 methodology of Rosenbloom-Tsfasman multiplicity error correction code. The Welch-Berlekamp decoding algorithm applies to both problems, and can be formulated as a numerically stable linear system. At ISSAC 2021 [1], Kaltofen, Pernet and Z.-H. Yang show that in the presence of a large error rate the multiplicity code is sub-optimal for fields of characteristic zero, that is, uses more values than are necessary for a unique interpolant. The interpolation algorithm at ISSAC 2021 does not use the Welch-Berlekamp error locator polynomial with multiplicities, and instead iterates the Reed-Solomon decoder. In my talk, I will investigate the numerical stability of our new Hermite interpolation algorithm with error correction.

Keywords
Hermite interpolation, Multiplicity error correction code, Reed-Solomon error correction code, high error capacity

[1] ERICH L. KALTOFEN; CLÉMENT PERNET; ZHI-HONG YANG, Hermite Interpolation With Error Correction: Fields of Zero or Large Characteristic and Large Error Rate. In *Proc. ISSAC 2021*, Marc Mezzarobba (eds.), ACM, New York, NY, 2021