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Burcin Erocal* (burcin@erocal.org), Johannes Kepler University, RISC, Altenbergerstr. 69, A-4040 Linz, Austria. *Algebraic Extensions for Summation in Finite Terms.*

The summation analogue of the Risch algorithm for indefinite integration was developed by Michael Karr based on towers of specialized difference fields called $\Pi\Sigma$ fields. In contrast to algorithms for indefinite integration, only transcendental extensions are allowed in these towers since algebraic extensions may force one to work over rings with zero divisors. This limits the set of expressions which can be modeled by $\Pi\Sigma$ fields. For example extensions involving $(-1)^n$ is outside the scope of Karr's algorithm. We present a new approach to this problem which allows us to have algebraic extensions in towers. This leads to effective algorithms extending the capabilities of Karr's algorithm. (Received September 13, 2010)