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*An undecidable nested recurrence relation*

A nested recurrence relation  $A(n)$  is undecidable if there is no algorithm that takes as input a finite set of initial conditions and which then correctly determines whether the recurrence relation is well-defined for all natural numbers. By well-defined we simply mean that the sequence  $A(1), A(2), \dots$  can be computed indefinitely, without ever referring to some value that was not determined previously. We show that

$$A(n) = A(n - 4 - A(A(n - 4))) + 4A(A(n - 4)) + A(2A(n - 4 - A(n - 2)) + A(n - 2))$$

is undecidable. (Joint research with Marcel Celaya.)