Reducibility and irreducibility of Stern polynomials

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(Joint work with Karl Dilcher.)

The classical Stern (diatomic) sequence was extended by Dilcher and Stolarsky to the Stern polynomials $a(n; x)$ defined by $a(0; x) = 0$, $a(1; x) = 1$, $a(2n; x) = a(n; x^2)$, and $a(2n + 1; x) = x\,a(n; x^2) + a(n + 1; x^2)$. These polynomials $a(n; x)$ are Newman polynomials, as they have only 0 and 1 as coefficients. Numerous reducibility and irreducibility properties for these polynomials will be proven. Special attention will be given to the divisibility properties for Stern polynomials of the form $a(2^k \pm 1; x)$. Cyclotomic polynomials will be identified as factors of the reducible Stern polynomials.