1035-65-197   **Raymond B Moberly*** (`moberly@sciences.sdsu.edu`). *Newton's Method with Fewer Bits.*
Newton's method for finding the roots of a polynomial equation is known to converge quadratically. The precision increases with each iteration – and this suggests that the computation of the iterative step (along with evaluations of the function and its derivative) could be performed with less precision initially, increasing precision in later iterations.

Iterative steps and function evaluation using limited precision is proposed as a more cost-effective implementation of Newton's Method in cases where the machine architecture supports such computational operations. FPGA-based computation offers this flexibility. Shown in this paper are FPGA computational performance predictions based upon synthesis targeted to a Xilinx Vertex II Pro FPGA.

The impact of limited-precision upon the solution and the number of iterations required is considered. Several single-variable polynomials and two-variable nonlinear polynomial systems are used to demonstrate and validate the proposed computational method. (Received August 16, 2007)