

**ICM-9205-34** On Best Uniform Rational Approximation of  $x^\alpha$  on  $[0, 1]$ , A. J. Carpenter and R.S. Varga, Numerical Algorithms, (to appear).

ABSTRACT: Let  $\alpha$  be a positive number, and let  $E_{n,n}(x^\alpha; [0, 1])$  denote the error of best uniform rational approximation from  $\pi_{n,n}$  to  $x^\alpha$  on the interval  $[0, 1]$ . We rigorously determined the numbers  $\{E_{n,n}(x^\alpha; [0, 1])\}_{n=1}^{30}$  for six values of  $\alpha$  in the interval  $(0, 1)$ , where these numbers were calculated with a precision of at least 200 significant digits. For each of these six values of  $\alpha$ , Richardson's extrapolation was applied to the products  $\left\{e^{\pi\sqrt{4\alpha n}}E_{n,n}(x^\alpha; [0, 1])\right\}_{n=1}^{30}$  to obtain estimates of

$$\lambda(\alpha) := \lim_{n \rightarrow \infty} e^{\pi\sqrt{4\alpha n}}E_{n,n}(x^\alpha; [0, 1]) \quad (\alpha > 0).$$

These estimates give rise to two interesting new conjectures in the theory of rational approximation.