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**Jeremy Rouse\*** ([rouseja@wfu.edu](mailto:rouseja@wfu.edu)). *Explicit bounds for sums of squares.*

For an even integer  $k$ , let  $r_{2k}(n)$  be the number of representations of  $n$  as a sum of  $2k$  squares. The quantity  $r_{2k}(n)$  is approximated by the classical singular series  $\rho_{2k}(n) \asymp n^{k-1}$ . Deligne's bound on the Fourier coefficients of Hecke eigenforms gives that  $r_{2k}(n) = \rho_{2k}(n) + O(d(n)n^{\frac{k-1}{2}})$ . We determine the optimal implied constant in this estimate provided that either  $k/2$  or  $n$  is odd. The proof requires a delicate positivity argument involving Petersson inner products. (Received November 15, 2011)