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Paul M Terwilliger*, Math Department, University of Wisconsin, 480 Lincoln Drive, Madison, WI 53706. *The Rahman polynomials and the Lie algebra $\mathfrak{sl}_3(\mathbb{C})$.*

We interpret the Rahman polynomials in terms of the Lie algebra $\mathfrak{sl}_3(\mathbb{C})$. Using the parameters of the polynomials we define two Cartan subalgebras for $\mathfrak{sl}_3(\mathbb{C})$, denoted H and \tilde{H} . We display an antiautomorphism \dagger of $\mathfrak{sl}_3(\mathbb{C})$ that fixes each element of H and each element of \tilde{H} . We consider a certain finite-dimensional irreducible $\mathfrak{sl}_3(\mathbb{C})$ -module V consisting of homogeneous polynomials in three variables. We display a nondegenerate symmetric bilinear form $\langle \cdot, \cdot \rangle$ on V such that $\langle \beta\xi, \zeta \rangle = \langle \xi, \beta^\dagger\zeta \rangle$ for all $\beta \in \mathfrak{sl}_3(\mathbb{C})$ and $\xi, \zeta \in V$. We display two bases for V ; one diagonalizes H and the other diagonalizes \tilde{H} . Both bases are orthogonal with respect to $\langle \cdot, \cdot \rangle$. We show that when $\langle \cdot, \cdot \rangle$ is applied to a vector in each basis, the result is a trivial factor times a Rahman polynomial evaluated at an appropriate argument. We also obtain two seven-term recurrence relations satisfied by the Rahman polynomials. This is joint work with Plamen Iliev. (Received January 20, 2011)