Spin-harmonic structures and balanced Spin(7) manifolds

We introduce a new kind of geometric structure on low-dimensional spin manifolds, defined by a nowhere vanishing harmonic spinor. These form a special class of SU(2), SU(3), G_2 and Spin(7) structures in dimension 5, 6, 7 and 8. We construct examples of manifolds endowed with a Spin(7) structure of balanced type.