Grid points on the ball with uniform and nonuniform weighted discrepancies

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The problem of distributing points on a closed domain has a long history. Apart from the domains like circle, sphere and cube, distribution of points on a ball have also found many applications in various fields with a focus on the applications in geosciences and medicine. There are many configurations of points available specifically on the surface of the ball, but only a few work has been done for the whole ball. Our work focuses on the construction of point grids on the ball together with a quantifying criteria, known as discrepancy with uniform and also with nonuniform weights, for the comparison of grids. The construction of the grids on the ball is dependable on the way of their evaluation and the purpose for which the grids are required. In our case, the construction depends on the Sobolev spaces based on particular differential operators together with their eigenvalues.