Abstract

Notions of affine walled-Brauer algebras ${\mathcal B}^{\rm aff}_{r,t}$ and cyclotomic (or level k) walled Brauer algebras ${\mathcal B}_{k,r,t}$ are presen. It is proven that ${\mathcal B}^{\rm aff}_{r,t}$ is free over a commutative ring with infinite rank and ${\mathcal B}_{k,r,t}$ is free with rank $k^{r+t}(r+t)!$ if and only if it is admissible in some sense. Using super Schur-Weyl duality between general linear Lie superalgebras ${\frak{gl}}_{m|n}$ and ${\mathcal B}_{2,r,t}$, we give a classification of highest weight vectors of ${\frak{gl}}_{m|n}$-modules M^{rt}_{pq}, the tensor products of Kac-modules with mixed tensor products of the natural module and its dual. This enables us to establish an explicit relationship between ${\frak{gl}}_{m|n}$-Kac-modules and right cell (or standard) ${\mathcal B}_{2,r,t}$-modules over $\mathbb C$. Further, we find an explicit relationship between indecomposable tilting ${\frak{gl}}_{m|n}$-modules appearing in M^{rt}_{pq}, and principal indecomposable right ${\mathcal B}_{2,r,t}$-modules via the notion of Kleshchev bipartitions. As an application, decomposition numbers of ${\mathcal B}_{2,r,t}$ arising from super Schur-Weyl duality are determined. This is a joint work with Hebing Rui.