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Structures of Nichols (Braided) Lie Algebras of Diagonal Type

Let V be a braided vector space of diagonal type. Let $\mathfrak{B}(V)$, $\mathfrak{L}^-(V)$ and $\mathfrak{L}(V)$ be the Nichols algebra, Nichols Lie algebra and Nichols braided Lie algebra over V, respectively. We show that a monomial belongs to $\mathfrak{L}(V)$ if and only if this monomial is connected. We obtain the basis for $\mathfrak{L}(V)$ of arithmetic root systems and the dimension of $\mathfrak{L}(V)$ of finite Cartan type. We give the sufficient and necessary conditions for $\mathfrak{B}(V) = F \oplus \mathfrak{L}^-(V)$ and $\mathfrak{L}^-(V) = \mathfrak{L}(V)$. We obtain an explicit basis for $\mathfrak{L}^-(V)$ over the quantum linear space V with $\dim V = 2$.

Keywords: Braided vector space, Nichols algebra, Nichols braided Lie algebra, graph.

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