The set-theoretic quantum Yang-Baxter equation: new perspectives and strategies

We provide an answer, in a special case, to the (extremely difficult) problem of Drinfel'd by proving that the category of solutions of the set-theoretic Yang-Baxter equation of Frobenius-Separability (FS) type is equivalent to the category of pointed Kimura semigroups. As applications, all involutive, idempotent, nondegenerate, surjective, finite order, unitary or indecomposable solutions of FS type are classified. For instance, if $|X| = n$, then the number of isomorphism classes of all such solutions on X that are (a) left non-degenerate, (b) bijective, (c) unitary or (d) indecomposable and left-nondegenerate is: (a) the Davis number $d(n)$, (b) $\sum_{m|n} p(m)$, where $p(m)$ is the Euler partition number, (c) $\tau(n) + \sum_{d|n} \left\lfloor \frac{d}{2} \right\rfloor$, where $\tau(n)$ is the number of divisors of n, or (d) the Harary number $\mathfrak{c}(n)$.

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