From principal series to finite-dimensional solutions of the Yang–Baxter equation

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We start from known solutions of the Yang–Baxter equation with a spectral parameter defined on the tensor product of two infinite-dimensional principal series representations of the group $\mathrm{SL}(2,\mathbb{C})$. Then we describe its restriction to an irreducible finite-dimensional representation in one or both spaces. In this way we obtain very simple explicit formulas embracing rational finite-dimensional solutions of the Yang–Baxter equation. Finally, we construct these finite-dimensional solutions by means of the fusion procedure and find a nice agreement between two approaches. The solutions of the Yang–Baxter equation on a tensor product of an arbitrary finite-dimensional and an arbitrary infinite-dimensional representations are matrices with operator entries. We show that they are products of several simply organized matrices and obtain for them explicit formulae.