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Dept of Math, CB 1146, Saint Louis, MO 63130. *Kummert's approach to realization revisited.*

We give a simplified exposition of Kummert's approach to proving that every matrix-valued rational inner function in two variables has a minimal unitary transfer function realization. A slight modification of the approach extends to rational functions which are isometric on the two-torus and we use this to give a largely elementary new proof of the existence of Agler decompositions for every matrix-valued Schur function in two variables. We use a recent sums of squares result of Dritschel to prove two variable matrix-valued rational Schur functions always have finite-dimensional contractive transfer function realizations. Finally, we prove that two variable matrix-valued polynomial inner functions have transfer function realizations built out of special nilpotent linear combinations. We also will present some open problems about finite dimensional realizations. (Received September 16, 2019)