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On $N=4$ super Riemann surfaces and the superconformal semigroup

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Abstract. The finite $N=4$ superconformal (SCf) transformations are obtained and classified into three types by means of the permanent of specific matrices. The properties of the latter are studied in connection with complex plane non-Euclidean geometry. The explicit expression for the $N=4$ SCf transformations allows them to be used as the transition functions for $N=4$ split and non-split super Riemann surfaces and SCf embeddings. The existence of the semigroup of SCf transformations is indicated.