1047-05-313 **Pavlo Pylyavskyy*** (pavlo@umich.edu) and **Thomas Lam**. *Total positivity in loop groups I: whirls and curls.*

We develop a theory of total positivity for loop groups. In this work, we completely describe the totally nonnegative part of the polynomial loop group, and for the formal loop group we describe the totally nonnegative points which are not totally positive. Furthermore, we make the connection with networks on the cylinder. Our approach involves the introduction of distinguished generators, called whirls and curls, and we describe the commutation relations amongst them. These matrices play the same role as the poles and zeroes of the Edrei-Thoma theorem classifying totally positive functions (corresponding to our case n=1). We give a solution to the "factorization problem" using limits of ratios of minors. This is in a similar spirit to the Berenstein-Fomin-Zelevinsky Chamber Ansatz where ratios of minors are used. (Received February 01, 2009)