1163-05-1384 **Daniel Slilaty*** (daniel.slilaty@wright.edu), Department of Mathematics and Statistics, Wright State University, Dayton, OH 45435. *Properties of Voltage Graphs Embedded in Surfaces.*

Given a multiplicative group Γ, a *voltage graph* (also called a *gain graph*) is a triple (G, φ) in which G is a graph and φ is a labeling of the oriented edges of G for which $\varphi(e^{-1}) = \varphi(e)^{-1}$. The labeling φ extends to any walk $e_1, \ldots, e_n$ by setting $\varphi(e_1, \ldots, e_n) = \varphi(e_1) \cdots \varphi(e_n)$. A closed walk w is said to be *balanced* when $\varphi(w) = 1$. An *embedding* of a voltage graph (G, φ) in a surface S is an embedding of G in S in which all facial boundary walks are balanced. Embedded voltage graphs have many interesting properties. We will survey some known results and state some unanswered questions. (Received September 15, 2020)