

# Applications of ordinary voltage graph theory to graph embeddability, Part 1

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## Abstract

Consider a cellular embedding of a graph  $G$  in  $S$ . A free action of a group  $A$  on  $G$  that extends to a cellular automorphism of the embedding of  $G$  in  $S$  is called a pseudofree action of  $A$  on  $S$ . It is a consequence of ordinary voltage graph theory that any such embedding can be encoded using an ordinary voltage graph. – Let  $p$  be a prime greater than 5. We will show that the Generalized Petersen Graph of the form  $GP(2p, 2)$  has no cellular embedding in the torus such that a group acts pseudofreely on the the corresponding cellular decomposition of the torus. We will also show that each  $GP(2p, 2)$  does embed in the Klein bottle in this way, and that the automorphism group of  $GP(2p, 2)$  does act pseudofreely on the torus given a different sort of embedded graph.

**Keywords:** graph, group, cellular embedding, generalized Petersen graph.