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Generalized Dutch Windmills Skolem Labelling

Let $D_{m,n}$ be a graph on $2k$ vertices and composed of two cycles C_m and C_n, $n \geq m$, with a vertex in common. We answer the question of whether it is possible to assign the labels $1, 1, 2, 2, 3, 3, \ldots, k, k$ to the vertices of $D_{m,n}$ such that the two vertices labelled i are of distance i for each $1 \leq i \leq k$; such a labelling is called Skolem labelling and may be used in testing distance reliability of networks. We show that $D_{m,n}$ does not have a Skolem labelling if and only if $n - m \equiv 3, 5$ (mod 8) and m is odd, thereby introducing a new way for proving that a Skolem labelling does not exist.