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The Fuss formulas in the Poncelet porism

In this paper we give a proof of Poncelet's closure theorem for ring domains using elementary functions and a certain differential equation which has a solution with suitable geometric properties. We give a necessary and sufficient condition of existence of a constant solution of the equation which explains the phenomenon of the Poncelet porism. In the last section we present a method of determination of the Fuss formulas for an arbitrary natural n. Additionally this method allows us to find the Fuss formulas for closed n-gons with self-intersections.