

Use of end area rule for the volume estimation in two dimensionally varying sections

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Volume estimation is a crucial aspect of the design phase as well as in post-construction stage in engineering projects, particularly in road construction. End area rule is the most widely used technique which is used in this regard, especially to calculate the volume between two cross sections. This study was conducted to examine the validity of the end area rule for two dimensionally varying section where two cross sections stand parallel to each other. The study was conducted using a numerical model developed using basic integration and a digital model developed using Blender 3.3 software. At first, it was concluded mathematically that the sectional area of the model does not vary linearly between the two ends resulting the end area rule is not valid since the rule depends on two basic assumptions where the two sections being parallel and the area varying linearly between the sections. The volumes of 10 objects with selected dimensions were calculated using conventional end area rule, numerical model and digital model. The results showed that the volumes given by later two methods as similar which can be considered as actual and a different result for the end area rule. This confirmed that the volume calculated by end area rule is deviating from the actual value making the end area rule is not valid. But a correction factor can be introduced such that end area rule is still valid and giving a closer result to the actual volume.

Keywords: End area rule, volume estimation, two dimensionally varying sections

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