Identification of closed space in FlowSimulation project

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1 Assumptions

In 2 dimensional case on the UI the user can edit the surface. It will be done in that way that the code can guarantee a closed parametric curve as a border. It starts at one of the most left point of the space and goes right. So the border of the space is described by a closed curve which starts (at $t = 0$) at one of the most left point and goes around the range in clockwise order.

2 Model

Due to the assumptions to determine a point $\underline{x}$ whether is it in the given range or not is easy. Denote the boundary with φ. We know that it goes around the range in clockwise order. We can choose the normal vector of the curve that it points against to inner points of the range.

Due to this if for a point x:

$$< \varphi(h_i) - x, n_i > \quad < 0 \qquad \forall i$$

then x is an inner point. This model is illustrated in the following picture: