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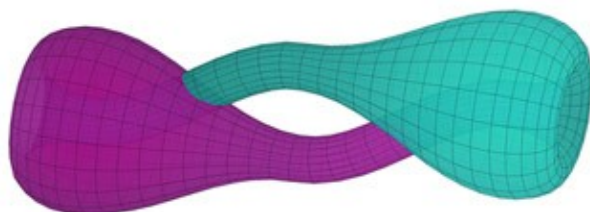
Features

Imaging maths – Inside the Klein bottle

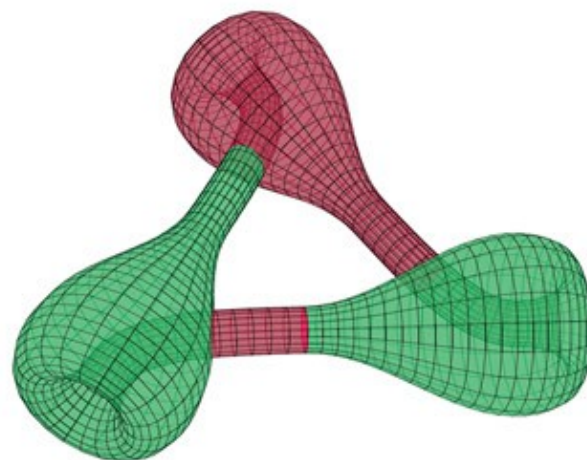


Experiments

1. The following two images show different closed tubes. Which of them is orientable, and therefore a torus, and which is a non-orientable Klein bottle? The applet versions allow you to rotate the shapes and to switch on normal vectors to make it easier to investigate.



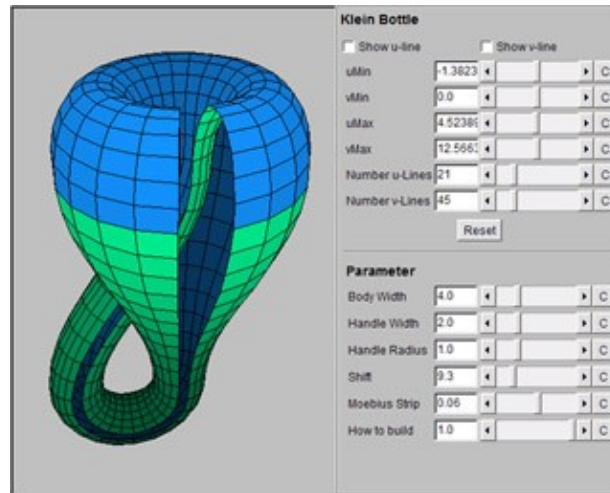
Two copies of the Klein bottle. ([Applet](#))



The degree of symmetry may be increased. Here three bottles are joined. Which numbers of bottles give non-orientable surfaces? ([Applet](#))

2. There is no unique geometric realization of a Klein bottle. The following interactive applet leaves all the decisions up to you! Experiment with different parameter settings.

Imaging maths – Inside the Klein bottle



The interactive Klein bottle. ([Applet](#))

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