Linear Operators on Graphs: Genus Preservers

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Let k be a nonnegative integer. A graph has genus k if it can be embedded without edge crossings on a smooth orientable surface of genus k and not on one of genus $k-1$. A mapping of the set of graphs on n vertices to itself is called a linear operator if the image of a union of graphs is the union of their images and if it maps the edgeless graph to the edgeless graph. We summarize research on preservers of the genus of a graph. If the operator is bijective, or if the operator preserves two genera, the linear operators are necessarily vertex permutations.