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A digraph H is *immersed* in a digraph G if the vertices of H are mapped to the vertices of G , and the edges of H are mapped to edge-disjoint (directed) paths of G . Consider the following algorithmic problem for a fixed (di)graph H :

Input: (di)graph G

Question: Is H immersed in G ?

This problem is polynomial-time solvable in undirected graphs for all H , whereas in digraphs the problem is sometime polynomial-time solvable and sometimes NP-complete, depending on the digraph H . We will discuss some progress made towards classifying digraphs into these two classes. We will also show that the problem becomes polynomial-time solvable for all H once you restrict to digraphs with bounded independence number.

One problem closely related to immersion is the k edge-disjoint paths problem. For fixed k , this can be solved in polynomial time in undirected graphs and is NP-complete in digraphs even when $k = 2$. However, just as with immersion, we will show that the problem becomes polynomial-time solvable for all fixed k once you restrict to digraphs with bounded independence number. (Received September 17, 2010)