Given a set X of vertices, we can use depth-first search to determine if $G - X$ has no cycles. Thus *undirected feedback set* is in NP.

We now show that *vertex cover* can be reduced to *undirected feedback set*. Given a graph $G = (V, E)$ and integer k, construct a graph $G' = (V', E')$ in which each edge $(u, v) \in E$ is replaced by the four edges (u, x^1_{uv}), (u, x^2_{uv}), (v, x^1_{uv}), and (v, x^2_{uv}) for new vertices x^i_{uv} that appear only incident to these edges. Now, suppose that X is a vertex cover of G. Then viewing X as a subset of V', it is easy to verify that $G' - X$ has no cycles. Conversely, suppose that Y is a feedback set of G' of minimum cardinality. We may choose Y so that it contains no vertex of the form x^i_{uv} — for it does, then $Y \cup \{u\} - \{x^i_{uv}\}$ is a feedback set of no greater cardinality. Thus, we may view Y as a subset of V. For every edge $(u, v) \in E$, Y must intersect the four-node cycle formed by u, v, x^1_{uv}, and x^2_{uv}; since we have chosen Y so that it contains no node of the form x^i_{uv}, it follows that Y contains one of u or v. Thus, Y is a vertex cover of G.

[1] ex867.590.603