Let G be a graph. For any family $R = R_k$ consisting of k pairs of vertices $(s_1, t_1), \ldots, (s_k, t_k) \in V(G) \times V(G)$, a *path system* of G rooted at R is a family $P_1, \ldots, P_k$ of k paths such that P_i is an s_i, t_i-path for each $i \in \{1, \ldots, k\}$, and $V(P_i) \cap V(P_j) = \{s_i, t_i\} \cap \{s_j, t_j\}$ holds for any two distinct indices $i, j \in \{1, \ldots, k\}$. When all (s_i, t_i) coincide with (s, t), the path system is termed as an *s, t-k-rail*. A path system is *spanning* if every vertex of G appears in at least one path in the system. A vertex ordering $v_1, \ldots, v_n$ of G is *k-thick* provided $|\{j : v_j v_i \in E(G), i < j \leq n\}| \geq \min(k, n-i)$ holds for each $i \in \{1, \ldots, n\}$ and is *Hamiltonian k-thick* if it is k-thick and even corresponds to a Hamiltonian path of G. Peng Li and Yaokun Wu recently initiated the study of the relationship between thick orderings and spanning path systems.

The existence of a (Hamiltonian) k-thick ordering in a graph guarantees that, even when "some" nodes are faulty, the surviving graph still has a spanning path system with various given roots of a size comparable to k.

Here is one specific result stated in more precise language. Take two nonnegative integers t and s with $s + t \leq k$ and $t \geq 2$. Let $v_1, \ldots, v_n$ be a Hamiltonian k-thick ordering of G. Then for every $S \in \binom{V(G) \setminus \{v_1, v_n\}}{s}$, $G - S$ contains a spanning v_1, v_n-t-rail and such a t-rail can be found in linear time.