1125-05-1007 **Katsuhiro Ota*** (ohta@math.keio.ac.jp), Department of Mathematics, Keio University, 3-14-1, Hiyoshi, Kohoku-ku, Yokohama, 223-8522, Japan. *Small theta subgraphs in sparse graphs.*

A *theta graph* is a graph consisting of three internally disjoint paths with common end vertices. By considering a BFS tree in a graph, it is not difficult to prove that if G is a graph of order n with minimum degree 3, then G contains a theta subgraph of order at most $6\log_2 n$. Note that the minimum degree condition is sharp, and there exists a graph of order n with average degree 3 which does not contain a theta subgraph of order $o(n)$.

In this talk, we consider slightly weaker conditions, which ensure the existence of small theta subgraphs.

(1) Let $\alpha > 0$ and let G be a graph of order n with average degree at least $3+\alpha$. Then, G contains a theta subgraph of order at most $(\frac{9}{\alpha}+3)\log_2 n$.

(2) Let $\beta > 0$ and let G be a graph of order n without isolated vertices. For $d \in \{1,2\}$, let n_d denote the number of vertices of degree d in G. If $4n_1+3n_2 \leq (1-\beta)n$, then G contains a theta subgraph of order at most $(\frac{6}{\beta}+1)(6\log_2 n+1)$.

These results enable us to prove that every large enough graph with minimum degree at least $2k+1$ contains k vertex-disjoint isomorphic theta subgraphs.

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