

## A RAMSEY-TYPE THEOREM FOR MULTIPLE DISJOINT COPIES OF INDUCED SUBGRAPHS

TOMOKI NAKAMIGAWA<sup>1</sup>

*Department of Information Science  
Shonan Institute of Technology  
1-1-25 Tsujido-Nishikaigan, Fujisawa  
Kanagawa 251-8511, Japan*

**e-mail:** nakami@info.shonan-it.ac.jp

### Abstract

Let  $k$  and  $\ell$  be positive integers with  $\ell \leq k - 2$ . It is proved that there exists a positive integer  $c$  depending on  $k$  and  $\ell$  such that every graph of order  $(2k - 1 - \ell/k)n + c$  contains  $n$  vertex disjoint induced subgraphs, where these subgraphs are isomorphic to each other and they are isomorphic to one of four graphs: (1) a clique of order  $k$ , (2) an independent set of order  $k$ , (3) the join of a clique of order  $\ell$  and an independent set of order  $k - \ell$ , or (4) the union of an independent set of order  $\ell$  and a clique of order  $k - \ell$ .

**Keywords:** graph decomposition, induced subgraph, graph Ramsey theory, extremal graph theory.

**2010 Mathematics Subject Classification:** 05C55, 05C35.

### REFERENCES

- [1] S.A. Burr, *On the Ramsey numbers  $r(G, nH)$  and  $r(nG, nH)$  when  $n$  is large*, Discrete Math. **65** (1987) 215–229.  
doi:10.1016/0012-365X(87)90053-7
- [2] S.A. Burr, *On Ramsey numbers for large disjoint unions of graphs*, Discrete Math. **70** (1988) 277–293.  
doi:10.1016/0012-365X(88)90004-0
- [3] S.A. Burr, P. Erdős and J.H. Spencer, *Ramsey theorems for multiple copies of graphs*, Trans. Amer. Math. Soc. **209** (1975) 87–99.  
doi:10.1090/S0002-9947-1975-0409255-0

---

<sup>1</sup>This work was supported by KAKENHI(23540168). The extended abstract of the paper is published in Electron. Notes Discrete Math. **43** (2013) 97–102, Erdős Centennial.

- [4] R.L. Graham, B.L. Rothschild and J.H. Spencer, Ramsey Theory, 2nd Edition (Wiley, New York, 1990).
- [5] T. Nakamigawa, *Vertex disjoint equivalent subgraphs of order 3*, J. Graph Theory **56** (2007) 159–166.  
doi:10.1002/jgt.20263

Received 22 May 2012  
Revised 21 February 2013  
Accepted 4 March 2013