CLASSES OF GRAPHS WITH NO LONG CYCLE AS A VERTEX-MINOR ARE POLYNOMIALLY χ-BOUNDED

Ringi KIM [1] , O-joung KWON [2] , Sang-il OUM [3] and Vaidy SIVARAMAN [4]

1) *Department of Mathematical Sciences, KAIST, Daejeon, 34141, KOREA*

2) *Department of Mathematics, Incheon National University, Incheon, 22012 KOREA*

3) *Department of Mathematical Sciences, KAIST, Daejeon, 34141, KOREA*

4) *Department of Mathematics, University of Central Florida, Florida, 32816, USA*

Corresponding Author : Sang-il OUM, sangil@kaist.edu

ABSTRACT

A class $\mathcal{G}$ of graphs is χ-*bounded* if there is a function f such that for every graph $G \in \mathcal{G}$ and every induced subgraph H of G, $\chi(H) \leq f(\omega(H))$. In addition, we say that $\mathcal{G}$ is *polynomially* χ-*bounded* if f can be taken as a polynomial function. We prove that for every integer $n \geq 3$, there exists a polynomial f such that $\chi(G) \leq f(\omega(G))$ for all graphs with no vertex-minor isomorphic to the cycle graph C_n. To prove this, we show that if $\mathcal{G}$ is polynomially χ-bounded, then so is the closure of $\mathcal{G}$ under taking the 1-join operation.