

1018-13-190

**Catalin Ciuperca\*** ([catalin.ciuperca@ndsu.edu](mailto:catalin.ciuperca@ndsu.edu)), Department of Mathematics, North Dakota State University, Fargo, ND 58105, and **Florian Enescu** and **Sandra Spiroff**. *Growth of powers of ideals.*

Abstract: Given two ideals  $I, J$  in a commutative noetherian ring  $A$  with  $J \subseteq \sqrt{I}$ , for each positive integer  $n$ , one can define  $v_I(J, n)$  to be the largest integer  $k$  such that  $J^n \subseteq I^k$ . Samuel proved that the sequence  $\{v_I(J, n)/n\}_{n \geq 1}$  has a limit and asked whether it is always a rational number. The question has been positively answered by Rees and Nagata.

We will discuss some results which generalize their work. Let  $J_1, \dots, J_k, I$  be ideals in  $A$  such that  $J_i \subseteq \sqrt{I}$  for all  $i$ . We study the structure of the cone  $C = C(J_1, \dots, J_k; I)$  generated by

$$\{(m_1, \dots, m_k, n) \in \mathbb{N}^{k+1} \mid J_1^{m_1} \dots J_k^{m_k} \subseteq I^n\}.$$

(Received March 06, 2006)