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**Catalin Ciuperca\*** (ciuperca@earthlink.net), Department of Mathematics, North Dakota State University, Fargo, ND 58105, and **Florian Enescu** and **Sandra Spiroff**. *Asymptotic growth of powers of ideals*. Preliminary report.

Let  $A$  be a commutative Noetherian ring. Given two ideals  $I$  and  $J$  with the same radical, let  $v_J^I(n)$  be the largest integer  $k$  such that  $J^n \subseteq I^k$ . Samuel (1952) proved that the limit  $\lim_{n \rightarrow \infty} v_J^I(n)/n$  exists and asked whether it is always a rational number. The question has been positively answered by Rees and Nagata.

In this talk we discuss some natural extensions of their work. In particular, let  $J, K, I$  be ideals with the same radical, and let  $v_{J,K}^I(n, m)$  denote the largest integer  $k$  such that  $J^n K^m \subseteq I^k$ . We study the existence of the limit  $\lim_{(n,m)} v_{J,K}^I(n, m)/(n + m)$ . (Received August 15, 2005)