

Rüdiger Achilles (University of Bologna)  
**On the computation of Segre classes**

This is joint work with Mirella Manaresi.

After the paper by P. Aluffi, Computing characteristic classes of projective schemes, *J. Symbolic Comput.* 35 (2003), several papers on the subject have appeared, e. g., D. Eklund, C. Jost, C. Peterson (2013), M. Helmer (2016), C. Harris (2017). It seems that all these authors are not aware of L. J. van Gastel's important paper *Invent. Math.* 103 (1991), that allows to compute Segre classes using the Stückrad-Vogel algorithm.

Let  $X^q \subsetneq Y^{d-1} \subseteq \mathbb{P}_k^n$  be closed embeddings of schemes over an algebraically closed field  $k$ . Assume that  $Y$  is a pure dimensional and reduced. Let  $A$  denote its homogeneous coordinate ring,  $\mathfrak{m}$  the unique homogeneous maximal ideal of  $A$  and  $I$  an ideal of  $X$  generated by forms of the same degree. Then, using van Gastel's result, we show:

It is equivalent to compute

- the push-forward of the Segre class  $s(X, Y)$  to  $\mathbb{P}^n$ , that is,  $s_0[\mathbb{P}^0] + s_1[\mathbb{P}^1] + \dots + s_q[\mathbb{P}^q]$  in the Chow ring of  $\mathbb{P}^n$ ;
- the generalized Samuel multiplicities  $c_1(I, A), \dots, c_{q+1}(I, A)$ ;
- the mixed multiplicities  $e_{d-1-q}(\mathfrak{m}|I, A), \dots, e_{d-1}(\mathfrak{m}|I, A)$ .

N. D. Hoang and H. M. Lam (2012) computed the mixed multiplicities of *balanced* rational normal scrolls. We extend their result to all rational normal scrolls and obtain formulas for the Segre classes and for the generalized Samuel multiplicities of rational normal scrolls.