1023-14-1410   **Daniel C. Cohen**, **Graham Denham** and **Michael J. Falk*** (`michael.falk@nau.edu`), Dept. of Mathematics and Statistics, Northern Arizona University, Flagstaff, AZ 86011-5717, and **Alexander N. Varchenko**. *Resonant weights and critical loci of rational functions.* Preliminary report.

Suppose $\alpha_1, \ldots, \alpha_n$ are linear functionals on $\mathbb{C}^\ell$ and $\lambda \in (\mathbb{C}^*)^n$. We study the critical locus Σ_λ of the function $\Phi = \prod_{i=1}^n \alpha_i^{\lambda_i}$ in relation to the $\mathbb{C}$-algebra A generated by the 1-forms $\omega_i := d\alpha_i/\alpha_i$. Conjecturally, if the pth cohomology $H^p(A, \omega_\lambda)$ of A relative to multiplication by $\omega_\lambda = \sum_i \lambda_i \omega_i$ is nonzero, then Σ_λ has codimension at most p. We prove this in the case $\ell = 3$ using recent results of Falk and Yuzvinsky on multinets and pencils of curves. We extend the $\ell = 3$ result, in a weaker form, to arbitrary ℓ, in the special case where p is minimal with $H^p(A, \omega_\lambda) \neq 0$, and some nonzero element of $H^p(A, \omega_\lambda)$ is represented by a decomposable p-form. We indicate a potential alternate approach to these results via "tropical implicitization."

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