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**Michael DiPasquale\*** ([mdipasq@okstate.edu](mailto:mdipasq@okstate.edu)), OSU Mathematics Department, 401  
Mathematical Sciences Building, Stillwater, OK 74078. *A homological approach to freeness of  
multi-arrangements.*

Given a multi-arrangement of hyperplanes, we present a co-chain complex derived from work of Brandt and Terao on  $k$ -formality whose exactness encodes freeness of the multi-arrangement. The cohomologies of this co-chain complex thus present obstructions to freeness of multi-arrangements. We use this criterion to give some new examples of the behavior of multi-arrangements in moduli, as well as a new family of examples which fails Orlik's conjecture. This builds on previous work with Francisco, Schweig, Mermin, and Wakefield. (Received February 07, 2018)