1123-76-417 **Gene S Kopp*** (gkopp@umich.edu), Department of Mathematics, 2074 East Hall, 530 Church Street, Ann Arbor, MI 48109. *The arithmetic geometry of resonant Rossby wave triads.*

Linear wave solutions to the Charney-Hasegawa-Mima PDE with periodic boundary conditions have two physical interpretations: Rossby (atmospheric) waves, and drift (plasma) waves in a tokamak. These waves display resonance in triads: Linear combinations of three waves—with coefficients dependent on a slow time scale—satisfying the same (nonlinear) PDE. In the case of infinite Rossby deformation radius, the set of resonant triads may be described as the set of integer solutions to a particular homogeneous Diophantine equation.

We use elementary methods from algebraic geometry to determine the set of resonant triads as values of rational functions of three parameters. We then use more sophisticated number-theoretic methods to give a procedure for answering the question: For fixed $r \in \mathbb{Q}$, what are all wavevectors (x, y) that resonate with some wavevector (a, b) with $a/b = r$?

Finally, we illustrate the computational power of our approach. We find 463×24 resonant triads up to wavenumber bound $N = 5000$, improving on a calculation of Bustamante and Hayat. We also enumerate all resonant wavevectors of zonal group velocity zero up to the much higher bound $N = 10^{15}$. (Received August 30, 2016)