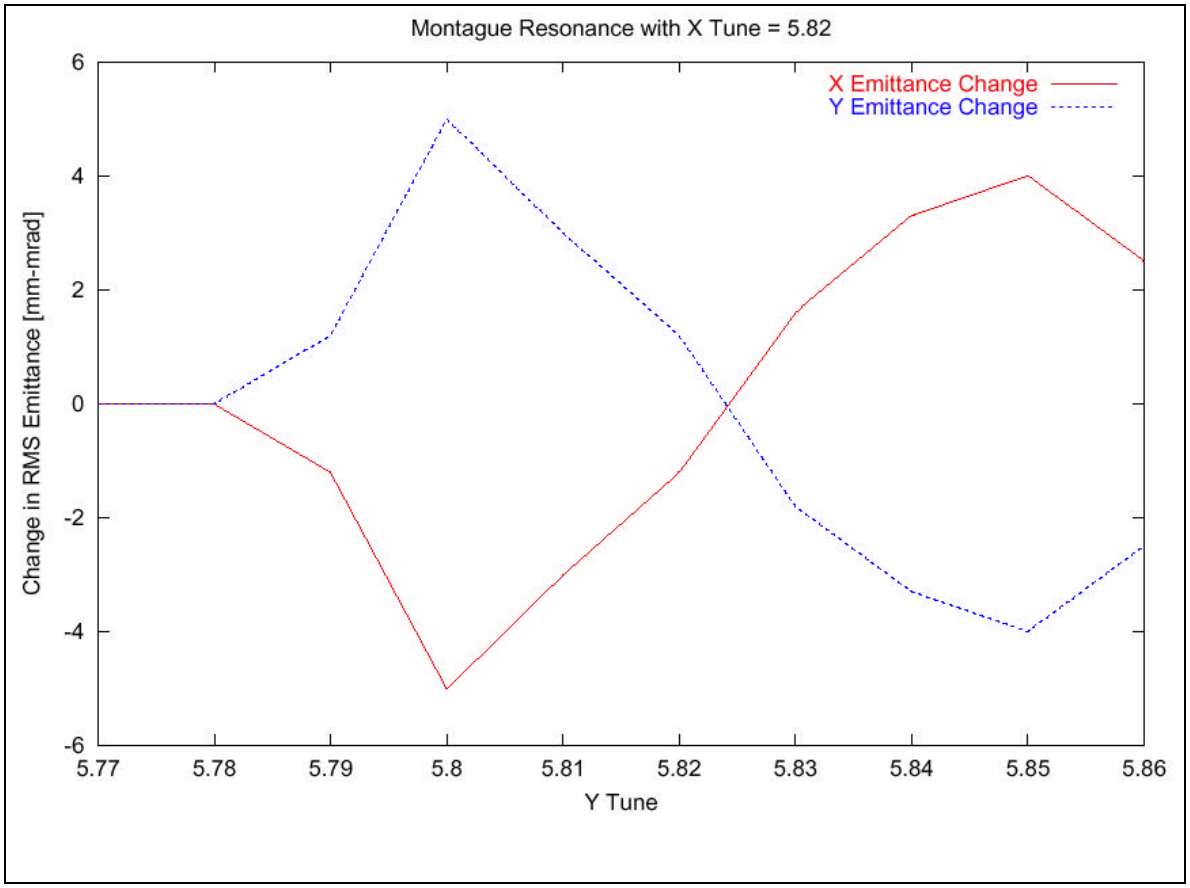
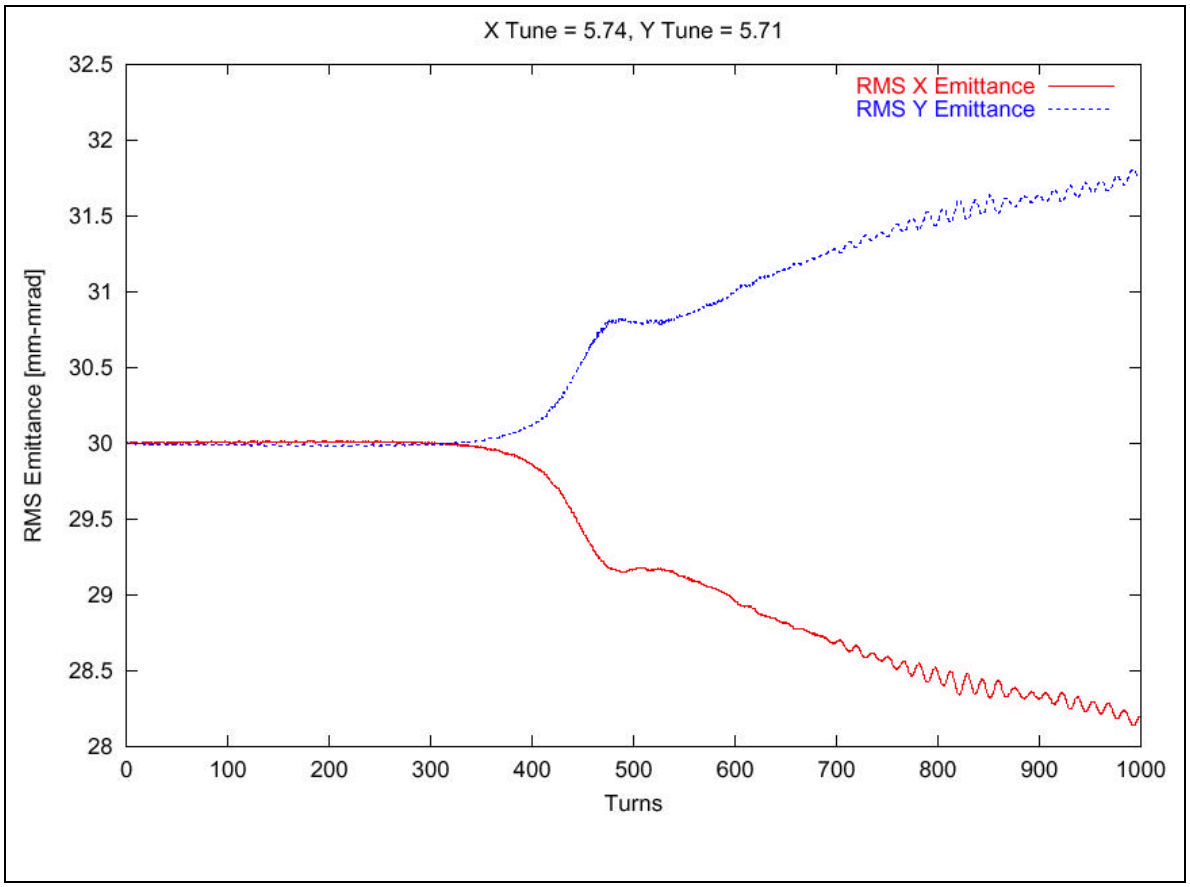
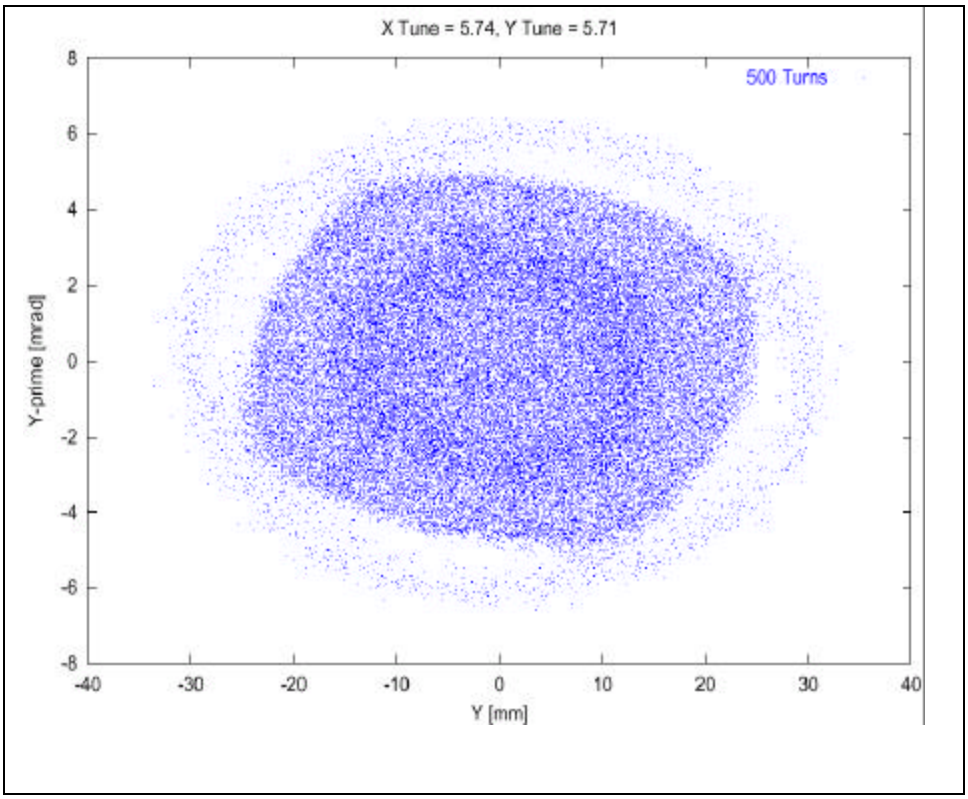
In the Montague resonance, the x and y tunes are nearly equal, and there is strong coupling between these two planes. This expedites energy exchange between the horizontal and vertical directions, as shown by the following figure which plots the change in emittances as a function of y tune for x tune = 5.82. Energy flows from the more strongly focused (higher tune) to the less strongly focused (lower tune) plane.

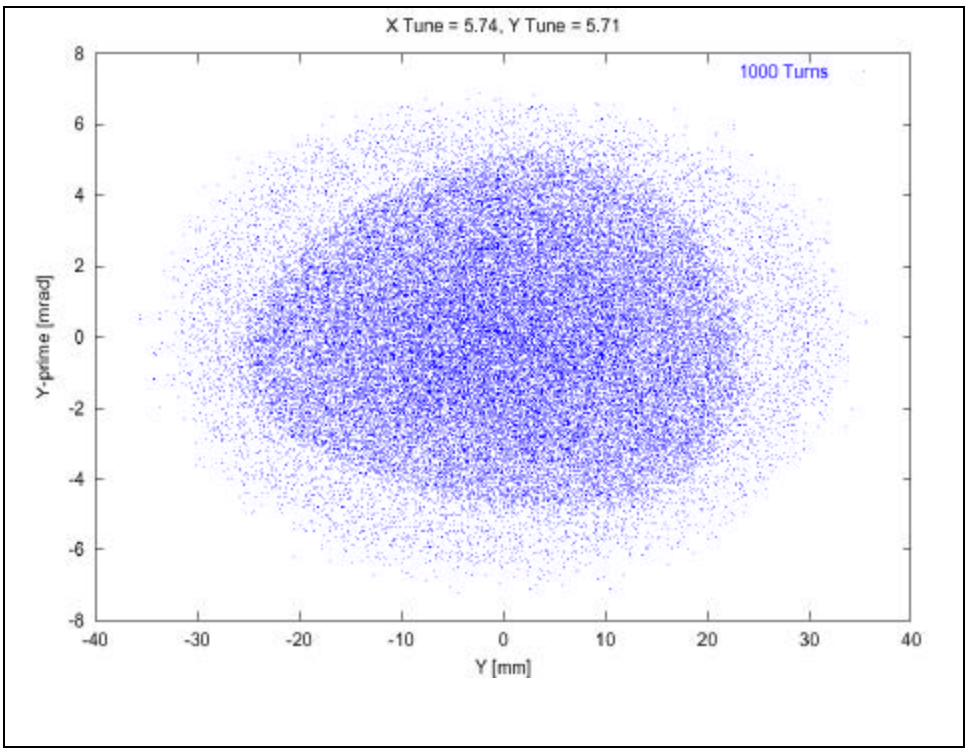


In this calculation at x tune = 5.74, y tune = 5.71, coupling leads to vertical emittance growth and horizontal emittance shrinkage.

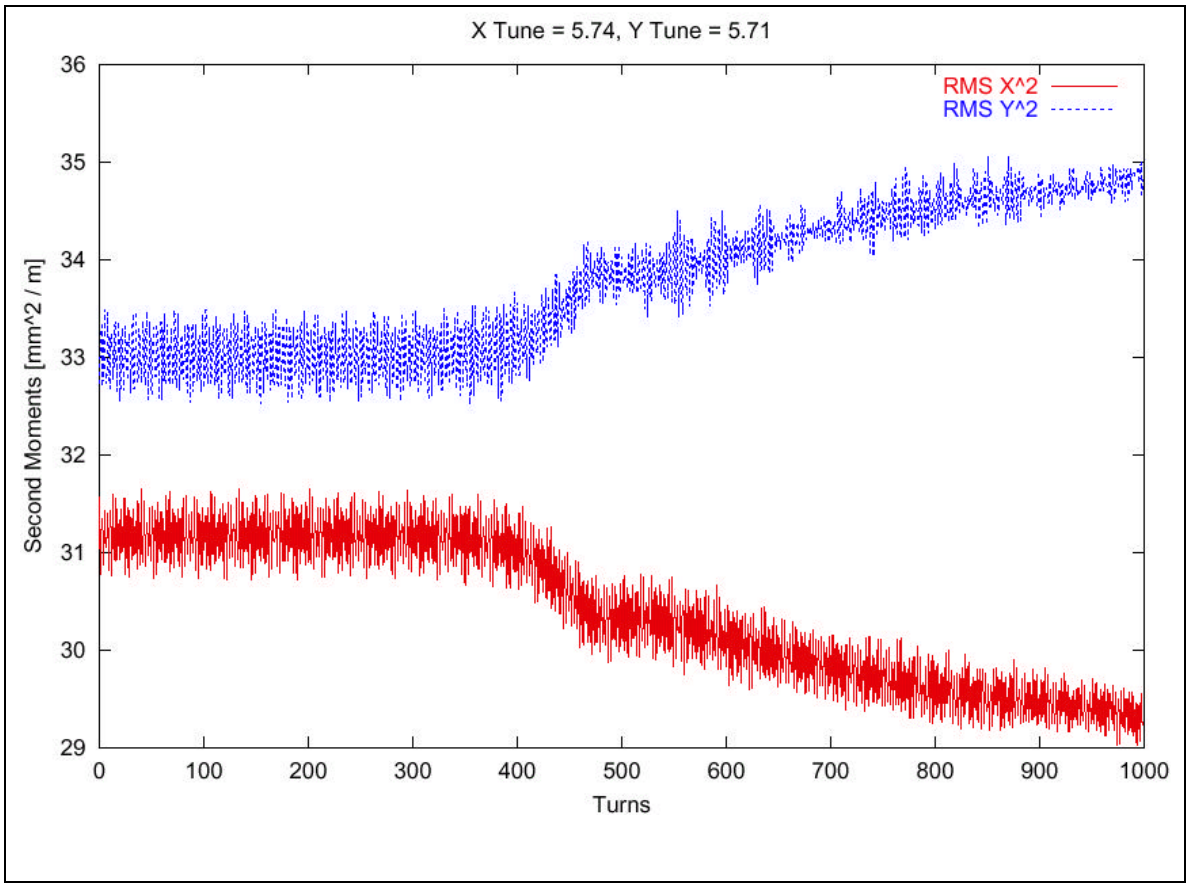


At 500 turns, the vertical phase plane shows a four-sided structure, and at 1000 turns we see a three-sided symmetry in the vertical plane.

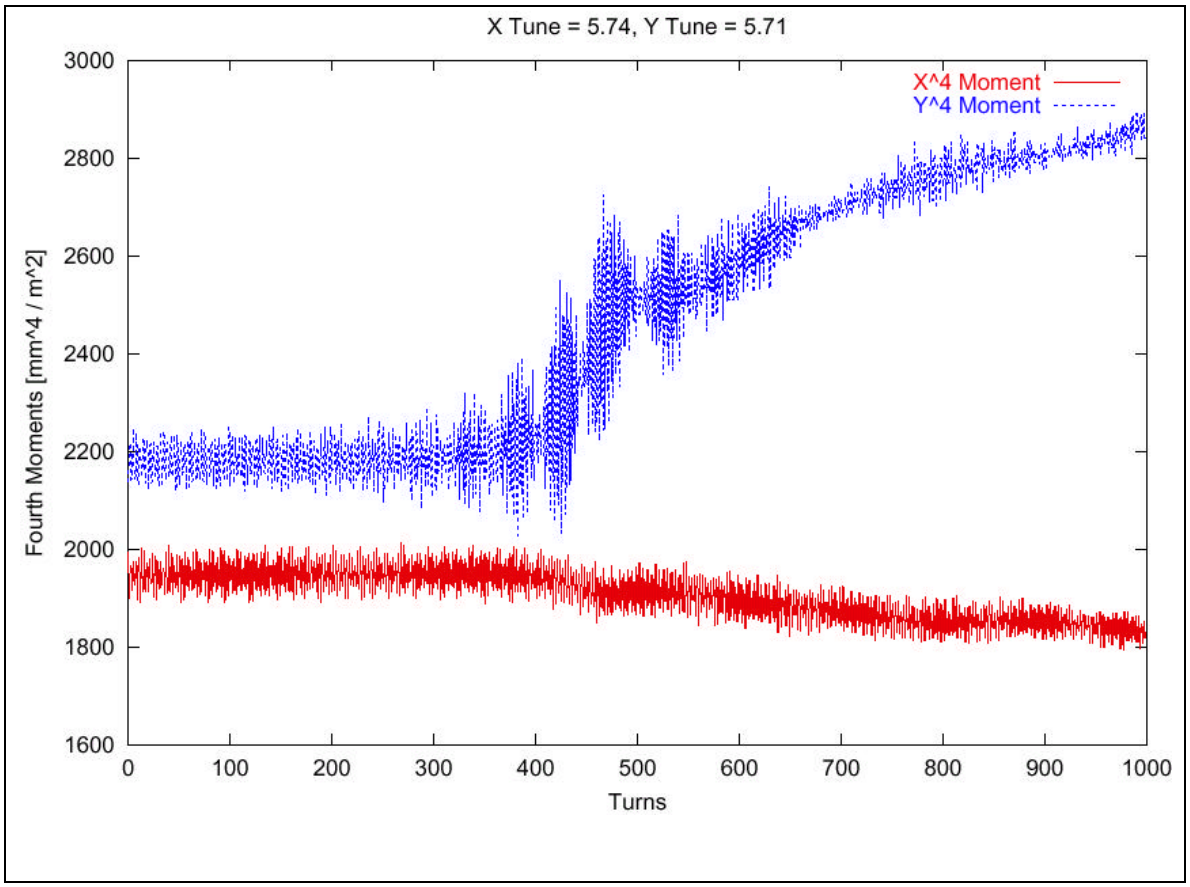




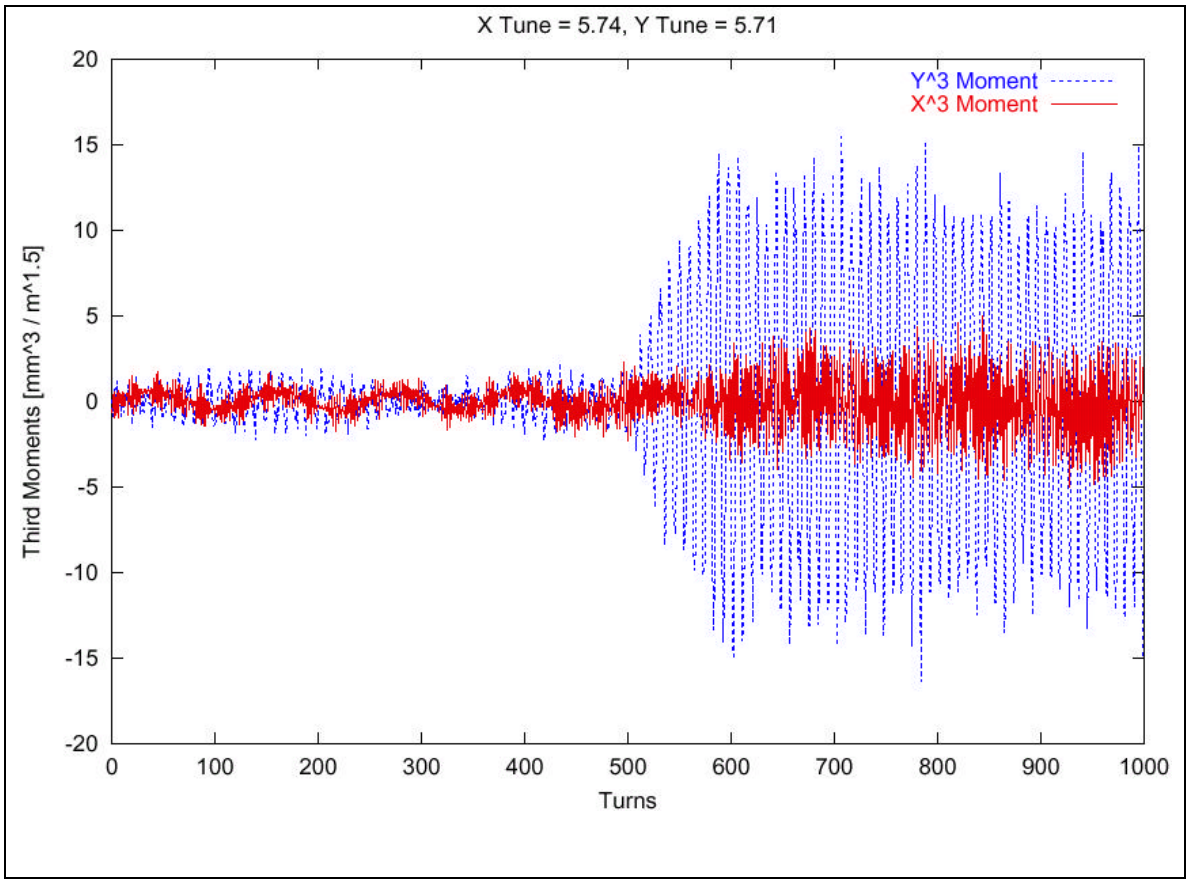
Second moments for this case show small (~2% peak-peak) variation, indicating that the KV distribution is well matched in an RMS sense.



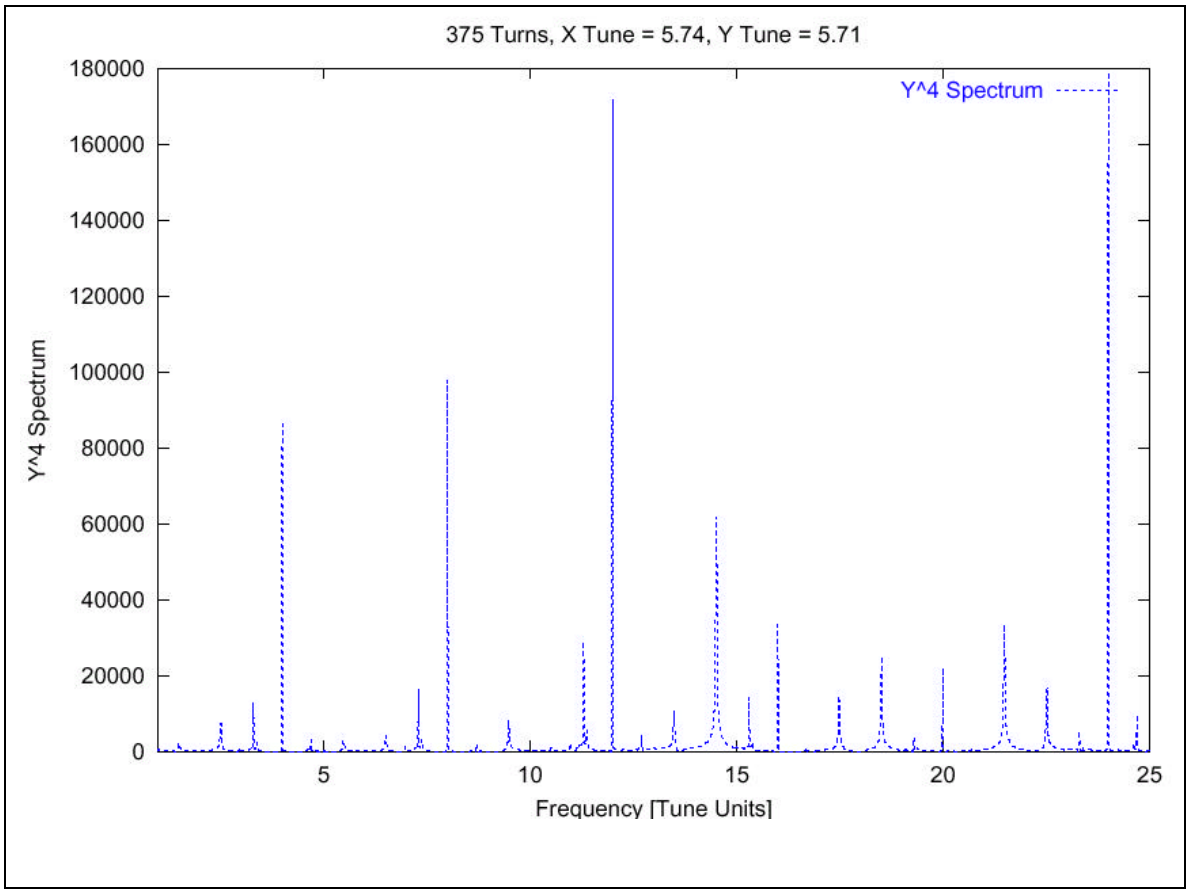
Fourth moments show activity in the vertical plane starting after about 300 turns, and this is presumably associated with the four-sided phase space shape seen at 500 turns.



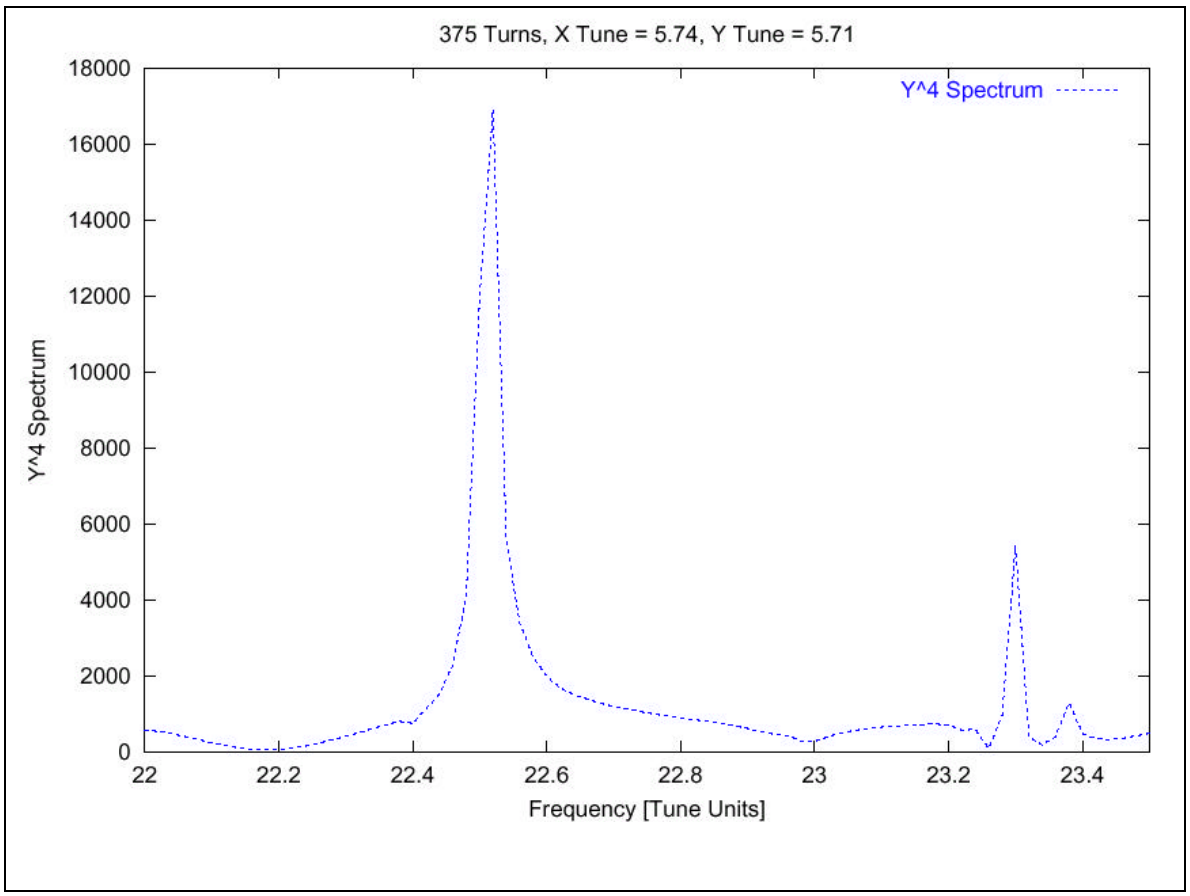
Third moments in the vertical plane show strong activity after 500 turns, and are presumably associated with the three-sided vertical phase space beam shape at 1000 turns.



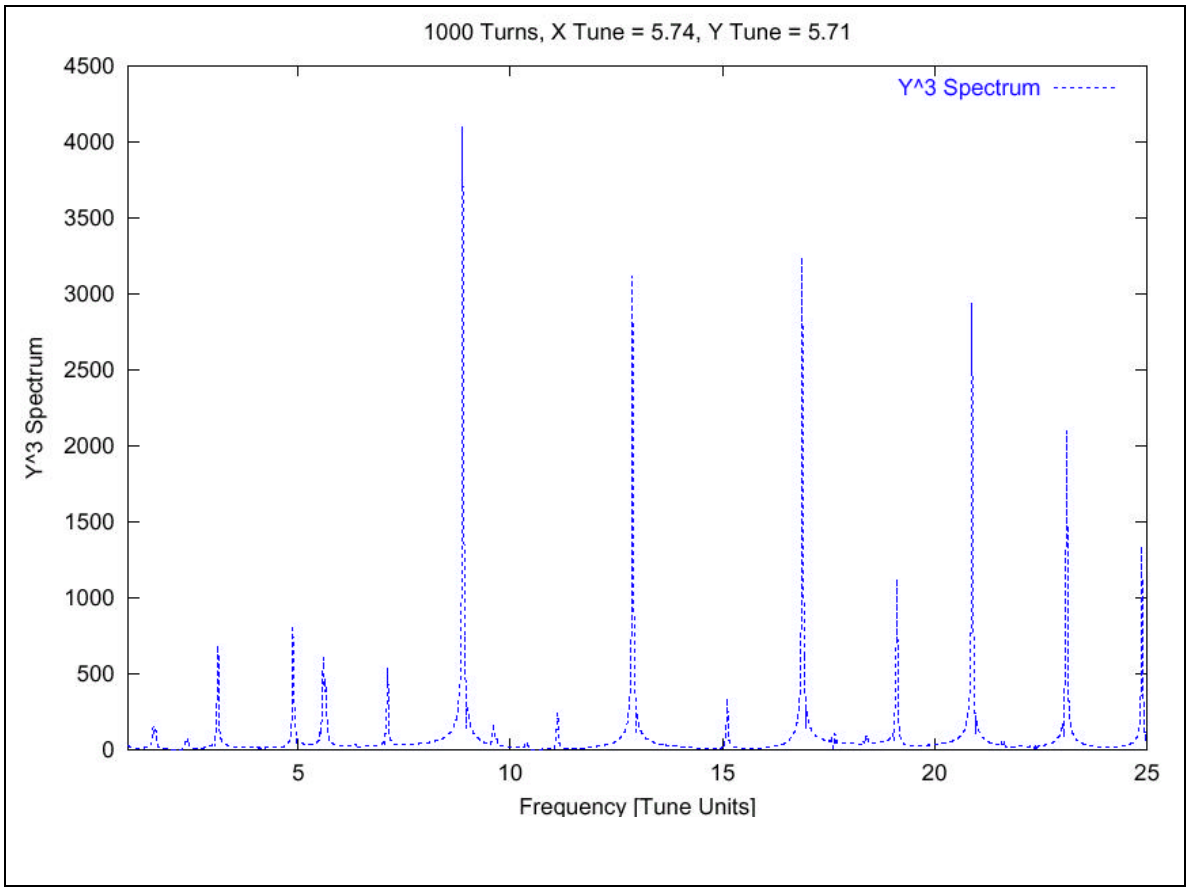
Spectrum of the y^4 moments at 375 turns for frequencies from 0-25 tune units. The largest peaks are at the fourfold symmetric lattice superperiodicities. Other peaks are related to collective motion.



Focusing on the frequency range from 22-23.5, there is a sizable peak near 22.5, consistent with Vlasov theory, but no component at 23, as would be expected from a higher order lattice resonance.



The y^3 moment spectrum at 1000 turns also shows components associated with collective oscillations.



The resonance peak at 16.9 is again consistent with Vlasov model predictions, but not with lattice periodicities.