ABSTRACT

I describe a new Velocity Dispersion Analysis, called Fractional Velocity Dispersion Analysis (FVDA) in this talk. The FVDA method has a number of advantages over the traditional VDA method.  Applying it to over 80 electron events observed by the Wind spacecraft, a distribution of electron path length is obtained for events in both solar maximum and solar minimum. The path lengths do not differ much from the value of that of the nominal Parker field (by assuming a solar wind speed in the range of 400 km/s to 700 km/s).  This implies that 1) energetic electrons in these events do not scatter much, 2) the field line do not "meander" much off from Parker field. To characterize how much meandering the field experiences, we further adopt a meandering field line model proposed by Giacalone and Jokipii. In this model, the amplitude of field line meandering is described by a random motion speed, Vg. Comparing our numerical simulations with observations shows that Vg has an upper limit of ~ 1 km/second. Such a speed can be related to supergranule motions on the solar surface.