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Chromospheric irregularities in density associated with decimetric fine structures

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Here we present a new method for inferring the scale size of the chomospheric irregularities in density by observing dynamic spectra of solar bursts. Brazilian Solar Spectroscope (BSS), operating in the frequency range of (1000-2500) MHz with high time and frequency resolutions for the last ten years, has observed various fine structures showing intensity variations as a function of time and frequency. These fine structures can be explained by various types of plasma emission mechanisms and or propagation effects. We have analyzed a group of fine structures observed by BSS, from August to October/2001, associated with decimetric type III bursts, showing variation of intensity as a function of frequency and curvatures in the frequency-time plane. In particular, these fine structures presented emission gaps of 50-100 MHz, and curvatures in the frequency-time plane exhibiting larger delay at the low frequency edge. Thus, the emission gaps and curvatures can be explained as a propagation effect due to chromospheric density inhomogeneities lying in the line-of-sight path between the observer and the radio source. If emitted frequencies are lower than the plasma frequency of the inhomogeneity, there will be absorption over a certain band, corresponding to the dimension of the inhomogeneity. The curved like structures are due to lower group velocities of the lower frequencies in the density inhomogeneities. These investigations enable us to determine the dimensions of the irregularities. Scale sizes of the irregularities obtained are of the order of 10-10000 km. Densities of the irregularities are of the order of 3% above the local ambient density.

Keywords: **solar flare**, **density irregularities**, **radio bursts**, **decimetric fine structures**

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