

Solar Spicules Generation Mechanism

H. Saleem^{1,2} and Zain H. Saleem³

¹Department of Physics, School of Natural Sciences (SNS),
National University of Sciences and Technology (NUST),
H-12, Islamabad (44000), Pakistan,

²Theoretical Research Institute, Pakistan Academy of Sciences,
3-Constitution Avenue, G-5/2, Islamabad (44000), Pakistan,

³Argonne National Laboratory, 9700 S. Cass Ave Lemont,
IL 60439, USA

Email: saleemhpk@hotmail.com

August 6, 2022

Abstract

It is assumed that a plasma slab of inhomogeneous density is created in between upper solar surface and lower chromosphere where temperature variation along upward direction prevails. Plasma gets accelerated in this region and moves upward where the density gradient becomes extremely small and it moves almost with constant velocity [1]. These slabs are created one after the other and hence long plasma structures, the spicules are formed. It is known that if ions are assumed to be static then the mechanism of the plasma flow generation is killed. An exact three dimensional (3-D) analytical solution of plasma equations has also been found. The physical model and mathematical formalism can explain the generation of longitudinally uniform flows, creation of coronal loops, solar wind and coronal mass ejection like phenomena in different regions of solar atmosphere.

References

- [1] H. Saleem and Z.H. Saleem, ApJ 927,72 (2022).