Whitney, Charles and Stone, Peter. Numerical integration for nonadiabatic compression waves in the solar atmosphere.

This work comprises a pilot calculation for a broad program concerning nonadiabatic compression waves in stellar atmospheres and interiors.

The present computation is aimed at laying a basis for an observational distinction between (a) the view that solar granulation is produced by a field of compression waves generated in the convection zone and (b) the view that in granulation we observe the emergence of convective cells themselves.

We have constructed an isothermal model solar atmosphere. This model serves as an initial configuration which we perturb by setting an infinite piston (at $\tau = 2$ in the initial atmosphere) in upward motion at time $t = 0$. The velocity of this piston is a sine-function of time and has a semi-amplitude of 1.5 km/sec. The piston executes a single oscillation.

Numerical integration of the non-linear equations of gas flow has given temperature, density, velocity, etc., as functions of height and time, on the assumption, justified by the results, that γ and μ are independent of time.

The equations of flow contain a nonadiabatic term describing the net rate of energy loss, at a point, by radiation. This term was evaluated on the transparent model, i.e., each mass-element is optically thin and "sees" only the initial state of the atmosphere.

A single integration has been performed to date, with a piston period of two minutes. The results indicate that (1) the amplitude of the temperature perturbation increases with height and is about one-half what it would be in the adiabatic case, attaining 300° after 50 seconds. (2) Calculation of emergent intensity of radiation shows that the wave produces a brightness increment increasing from 5 per cent when viewed normally to 12 per cent when viewed at $\mu = 0.2$. This suggests that granule contrast may increase with distance from the center of the disc. Such an increase would not be compatible with model (b) for granulation.

These integrations will be extended over a range of piston periods with a view to checking the assumptions and predicting:

(1) The brightness-versus-velocity relations for individual granules, and

(2) The fraction of the wave energy which is transmitted into the low chromosphere.

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Zirin, Harold. Observations of the calcium coronal lines in the vicinity of a limb flare.

Since the $\lambda 4086$ coronal line has been identified as due to *CaxIII* in the laboratory, we have attempted to compare it with the yellow line, $\lambda 5694$, to check its identification as *CaxV*. These lines were observed almost simultaneously, in the vicinity of an importance-two limb flare on December 18, 1956. The time variation of both lines parallels that of the flare. The Doppler half-widths of $\lambda 4086$ and $\lambda 5694$ are equivalent; both correspond to a temperature of $10,000,000^\circ$, if the broadening is purely thermal. Unless the line broadening is ascribed completely to microturbulence, the conclusion is inescapable that $\lambda 4086$ and $\lambda 5694$ are both due to highly ionized states of calcium, and therefore $\lambda 5694$ is probably due to *CaxV*.

Twenty-six emission lines are observed in the flare spectrum between $\lambda 3888$ and $\lambda 4143$. These include lines of *H*, *He*, *FeI*, *CaII*, *AlI*, *MnI*, *MgI*, *TiII* and *SrII*. Comparison of the *HeI* and *TiII* profiles yields a kinetic temperature around $200,000^\circ$.

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TITLES OF ADDITIONAL PAPERS PRESENTED
AT THE MEETING IN CAMBRIDGE,
MASSACHUSETTS

- Bahng, J. D., Code, A. D. and Whitford, A. E. A study of galactic rotation using improved distances of B stars and Cepheids.
Booker, Henry G. A theory of radio-star scintillation based on ionospheric turbulence.
Burbidge, E. Margaret and Burbidge, G. R. Element synthesis in the *BaII* stars.
Burbidge, G. R. Acceleration of cosmic-ray particles among extragalactic nebulae.
Cook, A. F. and Franklin, F. A. Optical properties of Saturn's rings: I. Transmission.
Field, George B. Time-dependent scattering of a resonance line by a dilute gas.
Fireman, E. L. and Zahringer, J. The depth variation of H^{β} and A^{37} in high-energy targets and in meteorites.
Goldstein, S. J., Maxwell, A. and Swarup, G. Sweep-frequency radio observations of the sun.
Halliday, Ian. Meteor wakes and their spectra.
Hawkins, Gerald S., Gaposchkin, Cecilia Payne and Whipple, Fred. The width of meteor trails.
Hazen, Martha L. Intensity distribution in elliptical galaxies of the Virgo cluster.
Henriksen, S. W., Genatt, S. H., Marchant, M. Q. and Batchlor, C. D. Surveying by occultations.