numerical schemes. In order to illustrate that this algorithm gives credible results, an analytical solution was used for a test case; we present the results of this test which show the computational accuracy for the case of a nonlinear force-free magnetic field is on the order of a few percent (\%S). Using data from the MSFC solar vector magnetograph as boundary conditions for this algorithm, we calculated the approximate nonlinear force-free magnetic field for a large sunspot that was on the solar disk on September 15, 1980 (A26665); we show typical results for the extrapolated field of this sunspot.

PERTURBATIONS in the scattered field itself. We find that the presence of the perturbed diffuse field alters the "bridging law" between the long and short wavelength limits, with important consequences for the PROPAGATION, though not the GROWTH, of perturbations. We find further that, in the absence of any photospheric limb darkening, the drag effect does indeed eliminate the instability at the very base of the wind, but that the instability growth rate rapidly increases as the flow moves outward from the base, reaching more than 50\% of the growth rate found in paper I within a stellar radius of the surface, and eventually reaching 80\% of that rate at large radii. Since this still implies a many e-fold growth within a characteristic wind outflow time, the primary conclusion that these winds are highly unstable therefore remains unchanged.

REFERENCES:

Session 50: Planetary Nebulae
9:40–5:30 (Coconino Room, Convention Center)
(Display Session)

50.01
The Electron Temperature and Emission Measure Distributions in the Planetary Nebula NGC7027
C.T. Daub (San Diego State University), J.P. Basart (Iowa State University)

We have developed a technique for calculating two-dimensional electron temperature and emission measure distributions of planetary nebulae based on marginally optically thick and optically thin radio observations. This procedure was applied to data collected on the planetary nebula NGC7027 with the VLA radio telescope at 20 and 6 cm wavelengths. The emission measure distribution closely follows the radio brightness distribution. However, the electron temperature distribution resembles the optical image. The peak temperature coincides with the peak optical brightness and the 13000 K contour follows the general outline of the optical image. We conclude that the optical appearance is primarily due to dust associated with the nebula and that these dust grains are responsible for the peculiar temperature distribution.

50.02
High Resolution CO Observations of NGC7027

We have made interferometer maps of CO (1-0) emission from NGC7027. These maps show that the neutral gas has a flattened distribution, which is consistent with the development of the ionized nebula contained within it. We have detected for the first time anomalous high-velocity CO emission. This emission originates in a layer of shocked, neutral gas surrounding the expanding HII region. From calculations of the shock parameters, we estimate a mass loss rate of 1.1 (-10)^{3} M_{\odot}/yr.

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