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Wave generation and magnetic field amplification in astrophysical shocks LUIS GARGATE, GoLP/Instituto de Plasmas e Fusao Nuclear, IST, Portugal, RICARDO FONSECA, DCTI, Instituto Superior de Ciencias do Trabalho e da Empresa, Portugal, JACEK NIEMIEC, Institute of Nuclear Physics PAN, Poland, ROBERT BINGHAM, SSTD, Rutherford Appleton Laboratory, UK, LUIS SILVA, GoLP/Instituto de Plasmas e Fusao Nuclear, IST, Portugal — Supernovae remnant shocks, producing Cosmic Rays (CR), and coronal mass ejection shocks, producing Solar Energetic Particles (SEP), have different features, but in both scenarios waves are known to propagate and to amplify the magnetic field and turbulence in the upstream region of the shocks. We analyze Bell's instability [1], in which small-scale non-resonant wave modes are driven by cosmic ray ions streaming in the shock precursor along a background magnetic field B0, and driving a current. We use hybrid simulations to study the feedback of magnetic turbulence produced on cosmic ray trajectories; our results show a significant magnetic field enhancement, strongly dependent on the relative flow velocity of the ion species, and show the formation of plasma-depleted cavities. We find that the saturation of the instability is associated with the sustainability of the current. The non-linear growth phase and the saturation phase are explored in detail, and a discussion of the relevance of the mechanism to the CR and SEP scenarios is also presented. [1] A. R. Bell, Mon. Not. R. Astron. Soc. 353, 550, 2004

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