

### Texts and References

**Required:** R. Kulsrud; “Plasma Physics for Astrophysics”

Strongly Recommended: S. Galtier, “Magneto-hydrodynamique”, in French, Vuibert  
E.N. Parker, “Conversations on Electric and Magnetic Fields  
in the Cosmos”, Princeton

### References:

- a.) *General Plasma Physics*
- i.) P. Sturrock; “Plasma Physics” - excellent physical insights, readable
  - ii.) N. Krall and A. Trivelpiece; “Principles of Plasma Physics” - encyclopedia
  - iii.) E. Lifshitz and L. Pitaevski; “Physical Kinetics” (Volume 10 of Landau and Lifshitz series) - good treatment of kinetic theory
  - \* iv.) B.B. Kadomtsev; “Tokamak Plasma: A Complex Physical System” - superb integrative approach to tokamak dynamics, but of general interest
  - v.) T. Boyd and J. Sanderson; “The Physics of Plasmas”
  - \* vi.) B.B. Kadomtsev; “Cooperative Effects in Plasmas” in Reviews of Plasma Physics, Vol. 22 – see Supplementary Materials
  - vii.) M. Kikuchi; “Frontiers in Fusion Research” – a theoretical look at practical issues in tokamak physics
- b.) *General and Astrophysical MHD*
- \* i.) D. Biskamp ; “Nonlinear Magneto-hydrodynamics” - broad, solid and easily accessible, focused on laboratory applications
  - \* ii.) H.K. Moffatt; “Magnetic Field Generation in Electrically Conducting Fluids” - superb treatment of basic dynamo theory and related topics available online at <http://www.igf.fuw.edu.pl/KB/HKM/>.
  - iii.) A.R. Choudhuri; “The Physics of Fluids and Plasmas” - good elementary text, deals with lab and astro
  - \* iv.) L. Mestel; “Stellar Magnetism” - excellent in-depth study of the subject
  - v.) E.N. Parker; “Cosmical Magnetic Fields” - broad but insightful coverage of all aspects of solar and galactic MHD, well written
  - \* vi.) P.A. Davidson; “An Introduction to Magneto-hydrodynamics”

- vii.) R.B. White, "Theory of Tokamak Plasmas"
  - viii.) Goedbloed and Poedts; "Principles of Magnetohydrodynamics", Vol. 1, 2 - good basic MHD text with considerable detail provided
  - ix.) K. Itoh, S.-I. Itoh, A. Fukuyama, "Transport and Structural Formation in Plasmas" - modern perspective on aspects of MHD
  - x.) J.P. Freidberg, "Ideal Magnetohydrodynamics" - in depth coverage of applications to laboratory plasmas
- c.) *General References*
- \* i.) L.D. Landau and E.M. Lifshitz; "Fluid Mechanics" - a classic
  - \* ii.) L.D. Landau and E.M. Lifshitz; "Electrodynamics of Continuous Media" - ditto
  - iii.) G.K. Batchelor; "An Introduction to Fluid Dynamics" - three in a row..., complements Landau
  - \* iv.) G.B. Whitman; "Linear and Nonlinear Waves" - yet another great one
  - \* v.) J. Lighthill; "Waves in Fluids" - excellent and accessible
  - vi.) T.H. Stix; "Waves in Plasmas" - encyclopedia
  - \* vii.) F. Shu; "The Physics of Astrophysics, Vol. I, II" - good basic graduate text on MANY topics, including fluids, MHD and plasmas
  - viii.) J. Binney and S. Tremaine; "Galactic Dynamics" - super text on galactic dynamics, no MHD or plasma but treatment of self-gravitating matter makes it relevant. Try the problems :).....
  - \* ix.) U. Frisch; "Turbulence-The Legacy of A.N. Kolmogorov" – classic book on turbulence ala' K41
  - x.) A. Townsend; "The Structure of Turbulent Shear Flow" – classic book on turbulence in real systems