

Galactic Dynamics and Magnetohydrodynamics

Suggested Texts: "Galactic Dynamics", J. Binney and S.D. Tremaine, 2nd Edition
 "Plasma Physics for Astrophysics", R.M. Kulsrud
 "Dynamics of Galaxies", G. Bertin

References:

- a.) *Galactic Dynamics*
 - i.) "Galactic Astronomy", J. Binney and M. Merrifield
- encyclopedia of phenomenology of galaxies
 - ii.) "Spiral Structure in Galaxies", G. Bertin and C.C. Lin
 - iii.) "Physics of Gravitating Systems I, II", A. Fridman and V.L. Polyachenko
- encyclopedia of theory of self-gravitating systems - *very* theoretical
 - iv.) "The Physics of Astrophysics, II - Gas Dynamics", F. Shu
- basic text on astrophysical fluid and gas dynamics,
Chapters 11, 12 very relevant and readable
 - v.) "Theoretical Astrophysics, III - Galaxies and Cosmology", T. Padmanabhan
- general text, Chapters 1-2 very relevant, and good condensed summary

- b.) *Fluids, Waves, Instabilities*
 - i.) "Fluid Mechanics", L.D. Landau and E.M. Lifshitz
- classic text on fluids - a must!
 - ii.) "Waves in Fluids", J. Lighthill
- classic text on waves - a must!
 - iii.) "Linear and Nonlinear Waves", G. Whitham
- excellent treatment of wave dynamics - a must!
 - iv.) "An Introduction to Fluid Mechanics", G. Batchelor
- another classic fluids text
 - v.) "Hydrodynamic and Hydromagnetic Stability", S. Chandrasekhar
- classic encyclopedia of instabilities
 - vi.) "Hydrodynamic Stability", P. Drazin and W.H. Reid
- good theoretical text

- c.) *Kinetic Theory*
 - i.) "Physical Kinetics", L. Pitaevski and E.M. Lifshitz
- good, but advanced text on kinetic theory
 - ii.) "Selected Papers on Noise and Stochastic Processes", N. Wax
- see Chandrasekhar paper, in particular, for discussion of dynamical friction
 - iii.) "Hamiltonian Chaos and Fractional Kinetics", G. Zaslavsky
- new, advanced text on kinetics. Addresses failure of conventional Fokker-Planck Theory

- d.) *Nonlinear Dynamics*
- i.) "Chaos in Dynamical Systems", E. Ott
 - great basic text, Chapter 7 especially relevant to Hamiltonian systems
 - ii.) "Regular and Stochastic Motion", A. Lichtenberg and M Lieberman
 - encyclopedic text on chaos, especially Hamiltonian
 - iv.) "Mechanics", H. Goldstein
 - the basics
 - v.) "Chaos in Classical and Quantum Mechanics", M. Gutzwiller
- e.) *MHD and Plasmas*
- i.) "Plasma Physics for Astrophysics", R.M Kulsrud
 - good astro-oriented text. Treats galactic dynamo
 - ii.) "Magnetic Field Generation in Electrically Conducting Fluids", H.K. Moffatt
 - classic text on dynamo theory - a must!
 - iii.) "Principles of Plasma Physics", N. Krall and A. Trivelpiece
 - general plasma text, including kinetic theory of waves in magnetized plasmas
 - iv.) "Cosmical Magnetic Fields", E.N. Parker
 - encyclopedic treatment of astrophysical MHD, including galactic magnetic fields