Functions of a complex variable (S1), Trinity Term 2012

Lecturer: F Hautmann

Lecture times: Wed, Thu, Fri at 12:00 in the Martin Wood Lecture Theatre

The course is intended as an introduction to the methods of complex analysis for physics undergraduates.

It presents the basic elements of the theory of functions of a complex variable and gives an introduction to applications, including the uses of residue calculus, contour integrals, conformal mapping.

Synopsis

I   The complex plane

II   Complex differentiation

III   Multi-valued functions

IV   Complex integration

V   Power series expansions

VI   Residue calculus

VII   Conformal mapping

VIII   Integral transforms

Recommended references

Textbooks on complex variables with emphasis on applications:

[1] R. Churchill, Complex variables and applications, McGraw-Hill
[2] G. Carrier, M. Krook and C. Pearson, Functions of a complex variable: Theory and Technique

Mathematical methods textbooks that contain useful presentations of complex variable include:

[3] P. Dennery and A. Krzywicki: Mathematics for Physicists, Dover
[4] M. Boas: Mathematical Methods in the Physical Sciences

Classic books on complex analysis:

[5] L. Ahlfors: Complex analysis
[6] W. Rudin: Real and complex analysis

Further reading and references for specific sections of the course will be given in the lectures.