Fachbereich 08 – Physik, Mathematik und Informatik
Institut für Mathematik

JOHANNES GUTENBERG UNIVERSITÄT MAINZ

Oberseminar zur Geschichte der Mathematik und der Naturwissenschaften

Minicolloquium: The Fresnel Wave Surface

9. Januar 2019, 17:00st, 05-522

Fachbereich 08 – Physik, Mathematik und Informatik

Institut für Mathematik

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Eisso J. Atzema, PhD (University of Maine, USA):

Ferdinand Engel (1805-1866) and the Models of the Fresnel Wave Surface at the University of Mississippi

Abstract:

Clearly, the turn of the 19th century was the golden age of the production of mathematical models and their use for educational purposes. The interest in mathematical models as a visualization aid, however, goes at least as far back as the first half of the 19th century. In this talk, I will discuss the early history of the manufacturing of mathematical models with a focus on the work of Christian Gottlieb Ferdinand Engel (Magdeburg,1805-New York, 1866). In particular, I will discuss his prize-winning plaster models of the Fresnel Wave Surface still on display at the University of Mississippi. Along the way, I will talk about his work under Gustav Magnus at the University of Berlin and under Alexander Bache at the Coastal Survey in Washington DC.

Dr. Marta Jordi Taltavull (JGU Mainz):

From Physics to Mathematics, from Fresnel to Plücker: the Fresnel wave surface

Abstract:

In 1821 Augustin Fresnel proposed that the propagation of light through biaxial crystals could be described by means of an imaginary surface, which is nowadays called the Fresnel wave surface. Biaxial crystals had posed a very challenging problem for optics ever since the 17th century, for light passing through them did not follow the ordinary laws of light propagation. The Fresnel surface was a tool to describe and to understand better this anomalous behavior.

Yet Fresnel wave surface did not just remain a tool for physicists. For Fresnel had published no derivation of the formula of the wave surface, other physicists and mathematicians after him turned their attention to the Fresnel surface, in particular James MacCullagh, William R. Hamilton, and Julius Plücker in the 1830s. They embedded it into more general mathematical theories, such as inversive geometry, and analyzed its properties as a mathematical surface. Relying on such mathematical properties, Hamilton even predicted a new optical phenomenon, conical refraction.

Was the Fresnel wave surface a physical or a mathematical object? My intention is to explore the character of the Fresnel wave surface in the boundary between physics and mathematics through the above-mentioned works.

Siehe auch: www.geschichte.mathematik.uni-mainz.de/oberseminar

Die Vorträge finden statt: Mittwoch, 9. Januar 17.oo – 19.3o h
Institut für Mathematik, Staudinger Weg 9, Raum 05-522

Interessenten sind herzlich willkommen.

Univ.-Prof. Dr. Tilman Sauer
Dr. Martina Schneider