

Doctoral Thesis

C. de Wit: **Mathematical Treatment of Optimal Ocean Ship Routing**,*
Thesis Delft University of Technology, 1968, 92 pp.

Author's Summary:

In this thesis a method is described to evaluate the least time track for a given ship to cross an ocean.

The sea conditions—changing with time—and the stationary sea currents are assumed to be known everywhere in the navigated region G . Also the ship's resistance and response in a given wave pattern are supposed to be given. In order to avoid metric difficulties, G is conformally mapped onto a plane, keeping the scale alteration as small as possible. This mapping is treated in chapter 2.

In the 3rd chapter the minimal time problem is discussed as an application of Pontryagin's theory on optimally controlled processes. The concept of a time-front is then introduced and the behaviour of the timefront gradient along a trajectory is analyzed. Some attention is given to possible structures of these fronts, while modifications of the general theory in case part of a trajectory coincides with the boundary are being discussed.

The 4th chapter contains a cursory treatment of wind wave prediction methods as well as a brief report on what is known so far about a ship's behaviour in sea waves.

The fifth chapter gives a treatment of a computer program to evaluate the optimal trajectory. This program serves to determine a ship's shortest track from the Western entrance of the English Channel to the New England coast.

* Requesters may obtain copies of this thesis from the author. Author's address: Delft University of Technology, Department of Mathematics, Julianalaan 132, Delft, the Netherlands.