WATER WAVE GENERATION LAB

PURPOSE: The purpose is to check wave generation theory.

SETUP: The setup consists of elongated box with a top that is flush with the floor of the wind tunnel. The box is filled with water.

PROCEDURE: Increase the air flow speed in the tunnel gradually until waves appear at the air water interface.

OBSERVATIONS: Compare the measured critical air flow speed from the setup with the theoretical critical speed.


OMEGA
CFMMASTER II

BACKGROUND

Kelvin and Helmholtz developed a theory for the generation of water waves by wind. They found that above a certain critical speed small waves in the water are able to extract energy from the passing air stream and grow. They found that the surface tension at the air water interface was a critical parameter. The critical speed theory is developed for a general case in the FSI notes. It gives

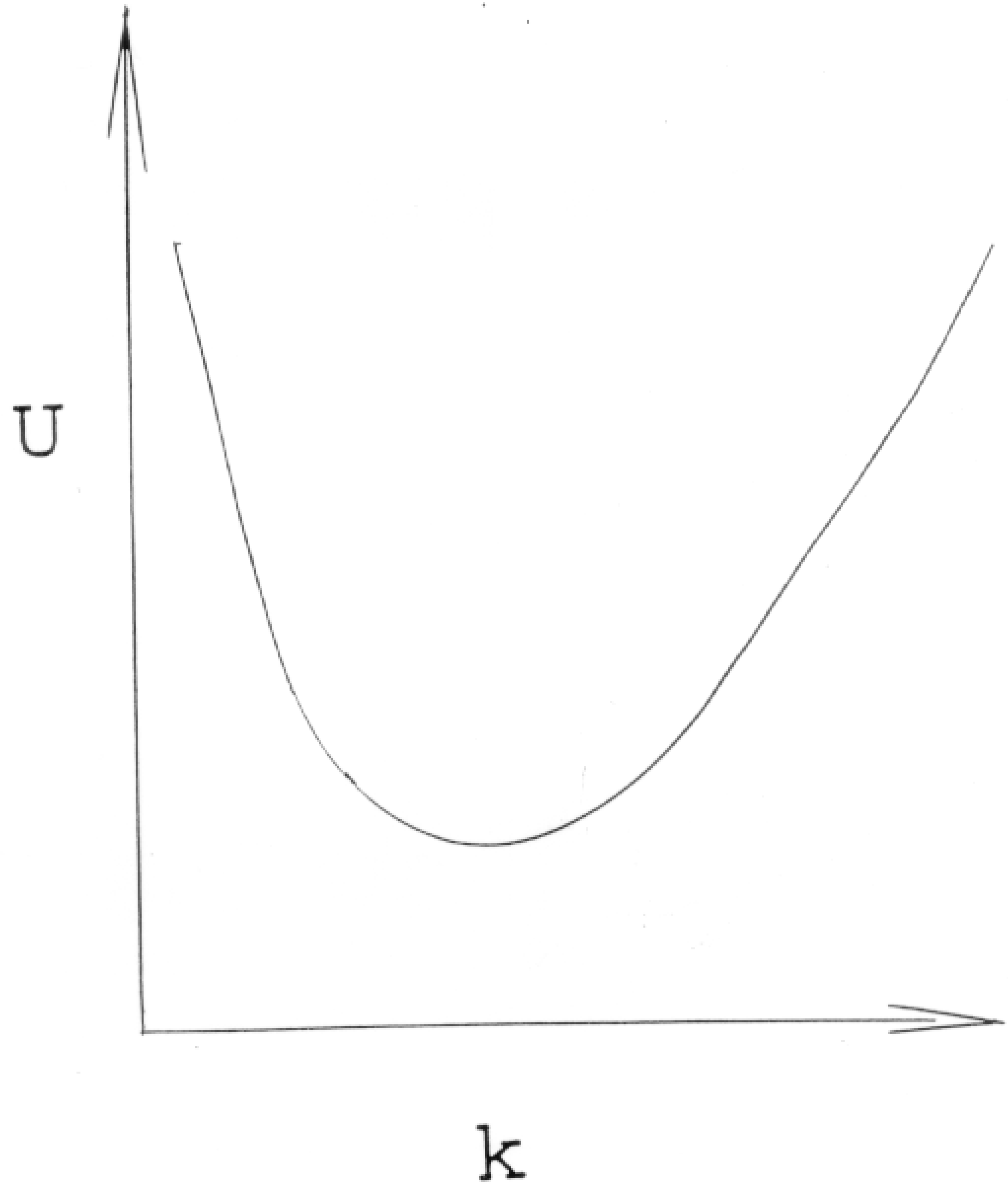
$$U^2 = S\ V/W$$

$$S = +\ Tk^2 - \rho_T g + \rho_B g$$

$$V = \rho_T/k + \rho_B/k$$

$$W = \rho_B \rho_T$$

This is plotted in the sketch on the next page. The minimum in this curve is the critical speed for wave generation.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