MACHINE CONFIGURATION

1.1 General description

A possible WEC concept with a linear generator as power take-off is shown in Figure (1). The WEC consists of a buoy coupled directly to the rotor of a linear generator by a rope. The tension of the rope is maintained with a spring pulling the rotor downwards. The rotor will move up and down at approximately the same speed as the waves and the maximum speed will be in the order of 1 m/s. The relatively low speed implies that the reaction force developed between the rotor and stator to be very high. For example, a 10 kW generator needs a reaction force in the order of 10 kN with a rotor speed of 1 m/s. This implies that a directly driven generator must be larger than a conventional high-speed generator.

(a)

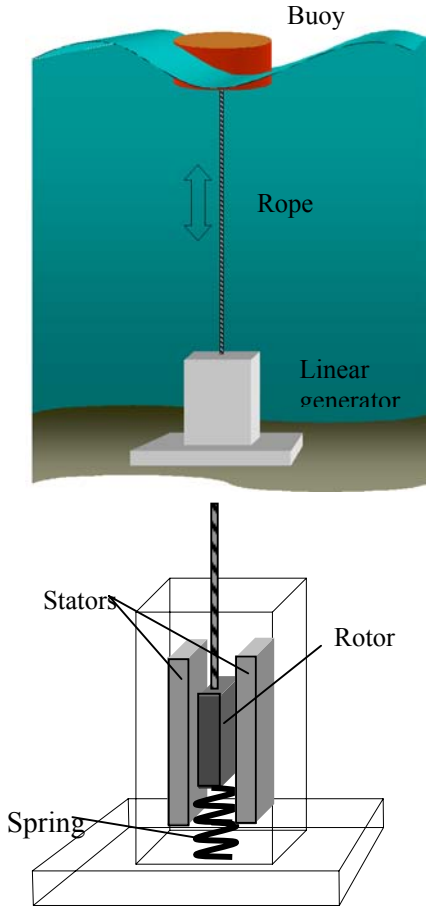

Figure (1): (on top) *The principles of a wave energy plant with a linear generator as power take-off. (bottom) Cross-section of the linear generator.*

1.2 Stator

The stator is made of laminated electrical steel, piled into one solid unit, se Figure (2). The conductors are power cables with a circular cross-section and a conducting area of 16 mm^2, insulated with a 1.1 mm PVC-layer, which adds up to an outer diameter of 7.2 mm. The coil winding is a three-phase winding with a slot per pole and phase ratio of 5/4. This winding configuration aims at minimizing the fluctuation in the output power caused by cogging. A three-phase LFM with a slot per pole and phase ratio equal to one is proposed as generator in the Archimedes Wave Swing [1].

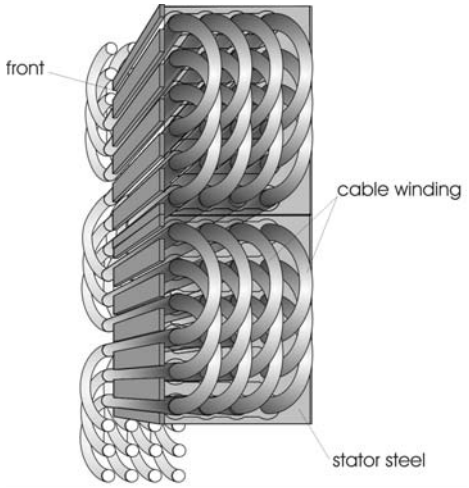

Figure (2): *Tilted side view of a section of the stator of LFM linear generator.*

1.3 Rotor

Two types of magnet fixation methods, surface mounting and burying magnets between pole shoes, are tested with two different types of permanent magnets. The two fixation methods are illustrated in Figure (3). In both configurations adjacent magnets have opposite polarity and a movement of the rotor creates an altering magnetic field in the stator coils.

b
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