ABSTRACTS

DEPARTMENT OF AERONAUTICAL ENGINEERING

SOME PROPERTIES OF BOUNDARY LAYER FLOW DURING THE TRANSITION FROM LAMINAR TO TURBULENT MOTION. S. Dhawan and R. Narasimha, *Journal of Fluid Mechanics*, January 1958, **3**, Part 4.

Transition in the boundary layer on a flat plate is examined from the point of view of intermittent production of turbulent spots. On the hypothesis of localized laminar breakdown, for which there is some experimental evidence, Emmons' probability calculations can be extended to explain the observed statistical similarity of transition regions. Application of these ideas allows detailed calculations of the boundary layer parameters including mean velocity profiles and skin friction during transition. The mean velocity profiles belong to a universal one-parameter family with the intermittency factor as a parameter. From an examination of experimental data the probable existence of a relation between the transition Reynolds number and the rate of production of the turbulent spots is deduced. A simple new technique for the measurement of the intermittency factor by a Pitot tube is reported.

DEPARTMENT OF POWER ENGINEERING

ELECTRICAL ENGINEERING SECTION

1. UNBALANCING DUE TO LARGE SINGLE-PHASE TRACTION LOADS IN A THREE-PHASE POWER SYSTEM. H. N. Ramachandra Rao, B. N. Narayana Iyengar and H. V. Sreenivasan, *Journal of the Institution of Engineers* (India), November 1957, **38** (3), Part 2.

The choice of the method of power supply for electric traction has been a subject of constant discussion. The question of railway electrification is of topical interest to India as the Indian Railways are exploring the feasibility of adopting single-phase, 50-cycle supply for traction. This, however, involves a few technical problems such as unbalancing in voltages and currents due to large single-phase traction loads, etc. In the light of these problems, the paper discusses the various factors which influence the choice and adoption of this system through the study on a two-machine system with three-phase, 110 kV, 120-mile long transmission line.

2. POWER SUPPLY FOR ELECTRIC TRACTION. H. N. Ramachandra Rao and B. N. Narayana Iyengar, *Indian Construction News*, February 1958.

There is no doubt that for a country like India which is deficient in natural resources of good quality coal and fuel oil, railway electrification would offer considerable economic advantages. It is estimated that electrification of a mile of track would save 400 tons of coal per annum.

The main obstacle to electrification of railways, especially main lines with comparatively low traffic density is the high first cost; and the choice of power supply for railways has a large bearing on cost. However, it should be recognized that modernization of transport cannot be based on financial considerations alone. It has to be undertaken as a national policy for conserving the country's fuel resources and providing an efficient and economical transport system for its defence and industrial progress.

Though the progress of electric traction in India has till now been meagre as compared with that in other advanced countries, the subject has become one of topical interest as several of the Indian Railways are exploring the feasibility of adopting modern systems and methods of large-scale electrification. Since the system of power supply is one of the most important considerations in electric traction, it is proposed to discuss a few of the technical aspects of the various systems in use.

The more recent development of the 1-phase, 50-cycle system is considered in somewhat greater detail and the results of a study made on unbalancing due to large single-phase traction loads, on a three-phase power system are also given.