平成１３年度博士前期課程入学試験問題

機能機械学　専攻	受験番号	
試験科目	英語	２枚中の２

Ⅱ

2.

1）　以下は Newtonian and non-Nowtonian fluids　について述べた文である。設問に答えなさい。

Fluids have been classified according to their viscous behavior in different ways. Wilkinson classifies them in two groups as Newtonian and non-Newtonian.

A fluid for which the dynamic viscosity μ depends on temperature (and slightly on pressure) and is dependent of the shear rate is called a Newtonian fluid. A graph relating shear stress and shear rate (velocity gradient) is a straight line through the origin whose slope is the dynamic viscosity. This graph is often called the flow curve, and is shown in Fig.1.

The non-Newtonian group has three sub-groups:

i) Fluids for which the shear stress depends only on the shear rate, and although the relation between them is not linear it is independent of the time of application of the shear stress,

ii) Fluids for which the shear stress depends not only on the shear rate, but also on the time the fluid has been sheared or on its previous history, and

iii) Viscoelastic fluids which exhibit characteristics of both elastic solids and viscous fluids.

The Bingham fluid acts as a solid for shear stresses less than τ_1, and as a Newtonian fluid for shear stresses greater than τ_1 (Fig. 1).

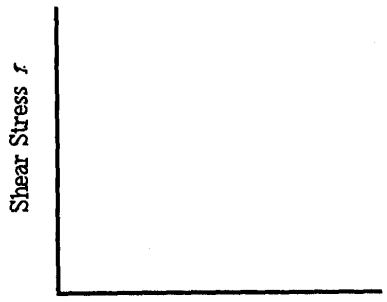

Fig.1 Viscous behavior of fluids, flow curves.

①　下線の three sub-groups について、日本文に訳して説明しなさい。

② Fig.1 に Newtonian fluid と Bingham fluid の線を入れなさい。

2）次の文を英訳しなさい。

力×時間で与えられる力積は運動量の変化に等しい。