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廃棄物海面処分場遮水工に用いられる遮水材の変形強度特性

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要　旨

本研究では，廃棄物海面処分場の遮水工に現在多く使用されている塩化ビニル（PVC）製遮水シートおよび短繊維不織布について，単軸引張り変形中に遮水シートに発生する応力，ひずみの温度依存性，ひずみ速度依存性，ならびに遮水シート，不織布の応力緩和特性を把握するための室内試験を行い，得られた結果について粘弾性モデルによる定量評価を試みた．その結果，温度の増加に対して遮水シートの破断強度は減少し，逆に破断ひずみは増大した．また，ひずみ速度の増加に対して遮水シートの破断強度は低ひずみ速度領域（～250 %/min）で増大する傾向がみられ，破断ひずみは若干の増大傾向を示した．遮水シートの応力緩和曲線はひずみ量によらずほぼ一定の傾向を示し，120分後の応力は初期応力の34％に緩和されたが，不織布の場合はひずみ量の増加とともに緩和率が増大する傾向を示し，最も緩和率の大きい場合でも120分後の緩和率は68％程度であった．以上の結果について，３要素および５要素粘弾性モデルを用いた遮水シートの単軸引張り変形に関する温度依存式，ひずみ速度依存式，および遮水シート・不織布の応力緩和に関する予測式を提案した．

キーワード：遮水シート・不織布・温度依存性・ひずみ速度依存性・応力緩和・粘弾性モデル

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Deformation and Strength Properties of Geosynthetics Applied at Coastal Confined Waste Disposal Site

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Synopsis

Laboratory examinations and numerical analyses were undertaken to clarify the deformation and strength behaviors of geomembrane and geotextile, applied at a seepage control structure in an offshore confined waste disposal site. Geomembrane, used in this study, is made of Polyvinyl Chloride (PVC), which is mainly used in an offshore waste disposal site. Tensile strength measured on several temperature conditions decreased linearly with the increase of temperature. On the contrary, change of maximum strain was proportional with the increase of temperature. Relationship between tensile stress and strain was evaluated on different strain rate conditions. As the result, tensile stress became larger with the increase of strain rate in the range of small strain, however, in the range of large strain, gradients of stress-strain curves became same for all strain rate conditions. Maximum strain was slightly increased with the increase of strain rate. Degree of stress relaxation of PVC was shown to be constant irrespective of the magnitude of strain, however, that of geotextile was increased with the increase of strain.

We proposed the equations about temperature and strain rate dependences of PVC's deformation and strength properties, and stress relaxation behavior of PVC and geotextile, by three- and five-element viscoelastic models.

Key Words: Geomembrane, Geotextile, Temperature dependence, Strain rate dependence, Stress relaxation, Viscoelastic model.

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