



**PENENTUAN KONDUKTIVITAS HIDRAULIK TANAH TIDAH JENUH  
DENGAN TENSIOHIGROMETRI DAN PERBANDINGANNYA TERHADAP  
MODEL EMPIRIS MUALEM**

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# **Determination of Soil Unsaturated Hydraulic Conductivity utilizing Tensiohygrometry and Its Comparison to Mualem Empirical Model**

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## **ABSTRACT**

Study on soil water characteristics in unsaturated zone is challenging since most of field condition are in unsaturated condition. Developing such study is very cumbersome restricted by the lack of apparatus for measurement. The objective of this research was to develop a simple method in determination of unsaturated hydraulic conductivity ( $K_u$ ) using tensiohygrometry. Natural soil sample from loam to clay loam collected from field using ring sampler of ...cm<sup>3</sup> in volume and 6 cm in height. Two gipsblock tensiometers and 1 hygrometer sensor inserted into soil sample through ring sampler's wall. Soil water content and soil water tension data, ranging from saturated to dry, collected in every 4 hours. From accumulated data the unsaturated hydraulic conductivity were determined using method of Wind (1960). The result showed there were a tendency of decreasing hydraulic conductivity occur along increasing soil water tension with drying process for all soil sample. Hydraulic conductivity for loam varies from  $2 \cdot 10^{-1}$  to  $3 \cdot 10^{-6}$  cm.day<sup>-1</sup> under water tension from  $9 \cdot 10^{-1}$  to  $9 \cdot 10^4$  hPa, and for clay loam varies from  $3 \cdot 10^{-2}$  to  $5 \cdot 10^{-6}$  cm.day<sup>-1</sup> under water tension from  $9 \cdot 10^{-1}$  -  $10^5$  hPa. In relation to Mualem empirical model on unsaturated hydraulic conductivity, it was found the hydraulic conductivity determined with tensiohygrometry method tends to underestimated for loam sample, but overestimated for clay loam. However, with respect to all of its weaknesses in accuracy, the applied tensiohygrometry utilizing gipsblock tensiometer and capacitance sensor showed as a promising method in detecting unsaturated soil hydraulic conductivity in the laboratory.

Keywords: *Gipsblock, Capacitance, Tensiohygrometry, Unsaturated Hydraulic Conductivity, Mualem Function.*

## DAFTAR ISI

	Halaman
<b>HALAMAN JUDUL</b> .....	i
<b>HALAMAN PEMBIMBING</b> .....	ii
<b>HALAMAN PENGESAHAN</b> .....	iii
<b>KATA PENGANTAR</b> .....	iv
<b>DAFTAR ISI</b> .....	v
<b>DAFTAR TABEL</b> .....	vii
<b>DAFTAR GAMBAR</b> .....	viii
<b>DAFTAR LAMPIRAN</b> .....	ix
<b>ABSTRAK</b> .....	x
<b>ABSTRACT</b> .....	xi
<b>NOTASI YANG DIGUNAKAN</b> .....	xii
<b>I. PENDAHULUAN</b> .....	1
1.1 Latar Belakang.....	1
1.2 Rumusan Masalah.....	2
1.3 Tujuan .....	3
1.4 Manfaat.....	3
<b>II. TINJAUAN PUSTAKA</b> .....	4
2.1 Konduktivitas Hidraulik .....	4
2.2 Tensiometer Gipsblock .....	6
2.3 Pengukuran Tegangan Air (Tensiometri) .....	8
2.4 Hubungan Konduktivitas Hidraulik Tidak Jenuh dengan Tegangan air tanah ( $\Psi$ ) .....	9
2.5 Fungsi Empirik Konduktivitas Hidraulik.....	10
2.5.1 Model Burdine .....	10
2.5.2 Model Mualem.....	10
2.5.3 Persamaan Brooks dan Corey.....	11
2.6 Hipotesis .....	12

<b>III. METODOLOGI PENELITIAN .....</b>	<b>13</b>
3.1 Tempat dan Waktu penelitian.....	13
3.2 Alat dan Bahan .....	13
3.3 Metode Kerja .....	14
3.3.1 Pembuatan Sensor Tensiometer .....	14
3.3.2 Identifikasi Karakteristik.....	15
3.3.3 Pengukuran Konduktivitas hidraulik Tidak Jenuh dengan Metode Tensiogravimetris.....	16
3.3.4 Pengukuran Karakteristik Fisika Tanah.....	17
3.3.5 Metode Perhitungan Konduktivitas Hidraulik Tidak Jenuh.....	20
3.3.6 Validasi Hasil Pengukuran .....	21
<b>IV. HASIL DAN PEMBAHASAN.....</b>	<b>22</b>
4.1 Pembuatan Sensor Tensiometer.....	22
4.2 Uji Sensivitas Sensor Gipsblock.....	22
4.3 Standarisasi Sensor Tensiometer .....	23
4.4 Karakteristik Sampel Tanah Uji .....	25
4.5 Pengukuran Konduktivitas Hidraulik Tidak Jenuh pada contoh Tanah Alami dengan Tekstur <i>loam</i> .....	26
4.6 Pengukuran Konduktivitas Hidraulik Tidak Jenuh pada contoh Tanah Alami dengan Tekstur <i>clay loam</i> .....	28
4.7 Konduktivitas Hidraulik Metode Tensiogravimetri Dibanding dengan Perkiraan Fungsi Mualem .....	32
<b>V. SIMPULAN DAN SARAN .....</b>	<b>35</b>
<b>DAFTAR PUSTAKA .....</b>	<b>36</b>
<b>LAMPIRAN .....</b>	<b>39</b>