LEAK DETECTION IN PIPELINES USING WAVELET AND CEPSTRUM ANALYSIS

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JUDUL: **LEAKAGE DETECTION IN PIPELINES USING WAVELET AND CEPSTRUM ANALYSIS**

SESI PENGAJIAN: **2012/2013**

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I hereby declare that the work in this report is my own except for quotations and summaries which have been duly acknowledged. The report has not been accepted for any degree and is not concurrently submitted for award of other degree.

Signature:
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LIST OF ABBREVIATIONS

CWT	Continuous Wavelet Transform
DWT	Discrete Wavelet Transform
MDPE	Medium Density Polyethylene
GI	Galvanized Iron
STFT	Short Time Fourier Transform
FT	Fourier Transform

NOMENCLATURES

VB	Volume Balance
Q_{in}	Supply flow into pipeline
Q_{out}	Delivery flow out of the pipeline
M	Mass of the fluid contained in the pipeline
C	Wave propagation speed
ρ	Density if the fluid
K	Bulk modulus of the liquid
E	Young's modulus of the pipe material
∅	Restraint factor dependent on the Poisson's ratio of the wall material and how well the pipe is supported
D	Diameter of the pipe
e	Wall thickness of the pipe
P	Wall thickness of the pipe
PI	Inlet pressure
V	Flow velocity
t	Valve closing time
L	Upstream pipe length
x(f)	Fourier transform
x(t)	Continuous function in time
j	$\sqrt{-1}$
Q(a, b)	Wavelet coefficients and a and b are the scale (dilation)
y(t)	vibration response signal
φ	the complex conjugate of the basis function