

بِه نام خداوند علم و قلم
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از استادان بزرگوالم، دكتر سید حسین (حسام الدین) صادقی و دكتر روزبه معینی مازندران، به دلیل راهنمایی‌های ارزنده و همراهی و همفکری بسیار سپاسگزارم. و از استادان محترم دكتر حسینیان و دكتر غلامی نیز که داوری این پروژه را بر عهده داشته‌اند صمیمانه قدردانی می‌نمایم.

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¹- Fast Fourier Transform (FFT)

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¹ Insulated Neutral
² Grounded Neutral

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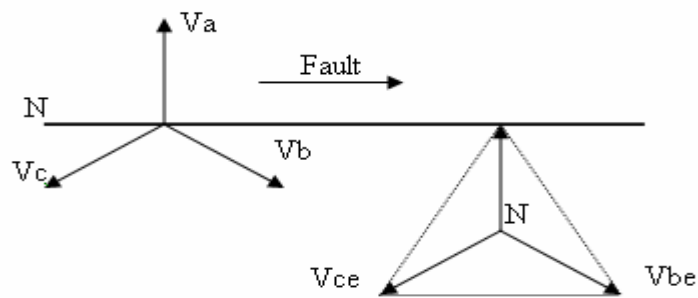
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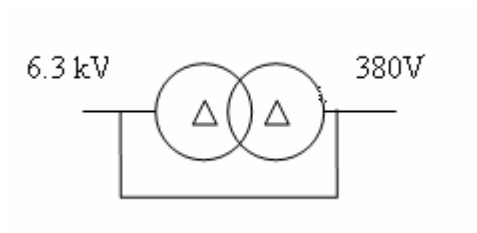
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$$V_{ae} = \frac{1}{\sqrt{3}} V_{ab} = V_{ac} = V_{bc} = V$$



¹ Solidly Grounded
² Sustained Over Voltage
³ Transient Over Voltage



X_c / X_L

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¹ Flash over
² Ground Conductor
³ Ground Rod
⁴ Grounded System

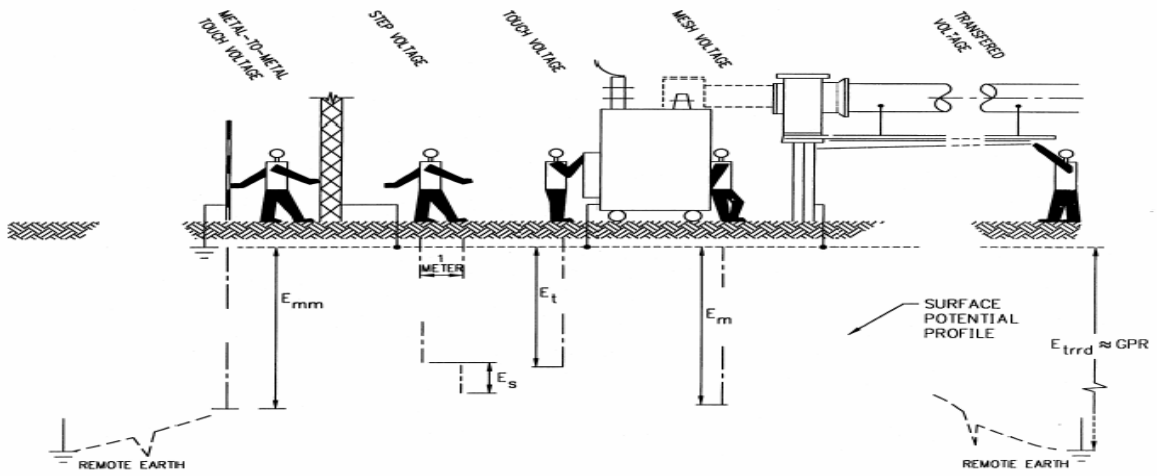
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- ¹ Touch Voltage
 - ² Step Voltage
 - ³ Transferred Voltage
 - ⁴ Mesh Voltage
 - ⁵ Metal-to-Metal Voltage

(NOAA)

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(LPS)

¹ Power Quality

² Voltage Sag and Swell

³ National Oceanographic and Atmospheric Administration

⁴ Electromagnetic Compatibility

⁵ Lightning Protection System

[۶] [۵]

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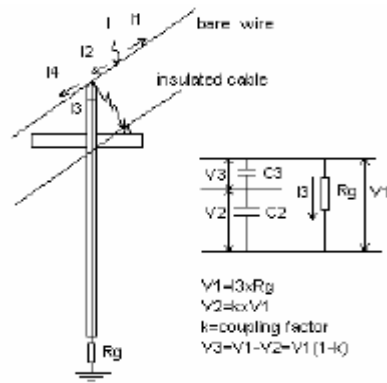
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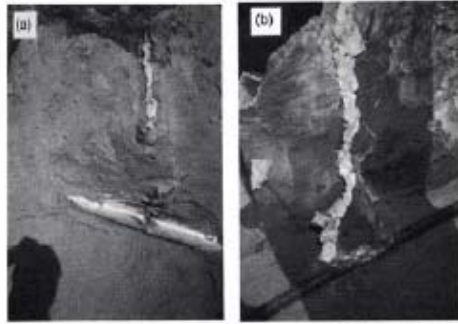
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Flashover

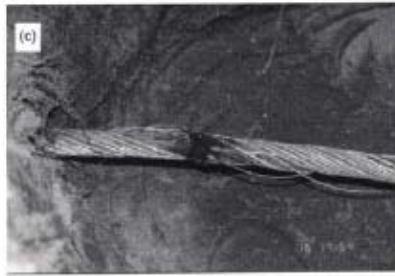


Flashover :



Cable A

Cable B



Cable C

(GPR)

¹ Overload
² Over voltage
 Ground Potential Rise³

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GPR

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GPR

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GPR

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GPR

IEC

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IEEE-80 (2000)

:(GPR)

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(Mesh Voltage)

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(Step Voltage)

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(Touch Voltage) (

GPR

(Tolerable Voltages) (

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$$E_{step50} = (1000 + 6C_s \times \rho_s) \times \frac{.116}{\sqrt{ts}}$$

$$E_{touch50} = (1000 + 1.5C_s \times \rho_s) \times \frac{.116}{\sqrt{ts}}$$

$$E_{step70} = (1000 + 6C_s \times \rho_s) \times \frac{.157}{\sqrt{ts}}$$

$$E_{touch70} = (1000 + 1.5C_s \times \rho_s) \times \frac{.157}{\sqrt{ts}}$$

:ts

•/

:ρ_s

:C_s

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$$C_s = 1 - \frac{.09(1 - \frac{\rho}{\rho_s})}{2h_s + .09} \quad ()$$

:(IG) (

¹ Fault Clearing Time

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layout

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dc

dc

dc

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¹ Decrement Factor
² Split Factor
³ single line diagram