# To Study The Current Carrying Capacity of Different Conductors Using Graphical User Interface in Matlab

Amit Kumar, Aniruddh Pyda

*ITM Universe Vadodarabehind Supreme Hotel, Near Jarod, Paldi Vadodara, Gujarat, India*

***Abstract:-****This paper presents Graphical User Interface (GUI) model of current carrying capacity of transmission lines using MATLAB. Now days computer system are mostly used graphical user interface (GUI) which allows users to interact with electronic device using graphical images. The GUI model includes parameters such as environmental conditions and physical factors. The calculation is done for various temperatures for different conductor's configuration. The design and calculation is performed according to Central Board of Irrigation*
*& Power (CBIP) publication no. 268.*
***Keywords:-****Current Carrying Capacity, Ambient Temperature, Equilibrium Temperature, Heat Balance Equation, Radiation Heat Loss, Convection Heat Loss, Solar Heat Gain*

## I. INTRODUCTION

The aim is to find out the current-temperature relationship by using the equations. The calculation is required to find out the capacity of the conductor, so that whenever the power is being transferred at rated voltage, the material of the conductor should not be damaged. The main objective is to calculate the current-temperature relationship of conductors. The main factors affecting the current carrying capacity are, material property of conductor, diameter of conductor, surface conditions conductor, the weather condition near the conductor, and current in the conductor.

A major advantage of GUIs is that they make computer operation more intuitive, and thus easier to learn and use.GUI allows users to click with a mouse instead of entering text at a command line. The graphical user interface, understood as the use of graphic icons and a pointing device. The goals of interface design are simple, to make working with a computer easy, productive. A fundamental reality of application development is that the user interface is the system to the users.

The Graphical user interfaces has ambient temperature, Equilibrium temperature, conductor diameter, conductor D.C resistance at 20 degree Celsius as an input parameters. And using the equations , the calculations has been done for the output parameters like Heat loss by radiation,
Solar heat gain by conductor, Convection heat losses, Heat generated by joule effect, AC resistance and Current carrying capacity. The fig 1 projected below shows the calculation for "current carrying capacity".

## II. GUI MODEL FOR CURRENT CARRYING CAPACITY



**fig.1:** GUI for current carrying capacity
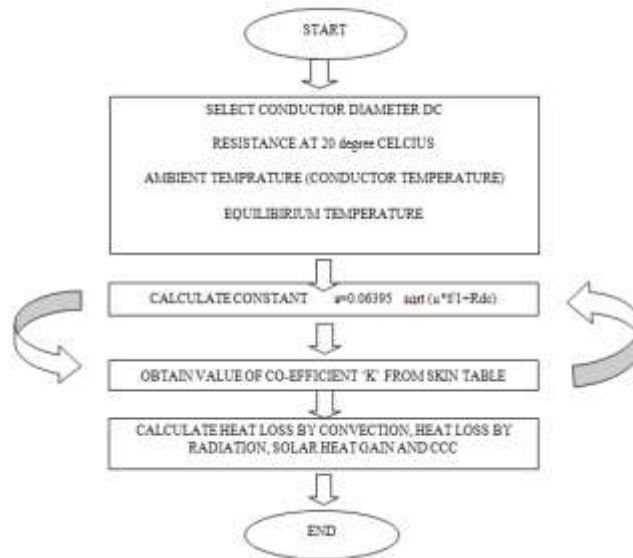
The flowchart gives the step wise procedure for calculating the current carrying capacity. In the first block, the input parameters are selected like conductor diameters, D.C resistance at 20 degree Celsius, Ambient temperature and equilibrium temperature. In the next block the constants have been taken and put in the equations to get a desired value which will help to get the calculation. After getting the calculation the desired value is being compared with the values of co-efficient 'k' and the values is selected form the skin effect table which is use for further calculation. In the next go the solar loss by convection, heat loss by radiation and the solar heat gain is being calculated and finally the current carrying capacity is calculated.

## IV. FORMAULAES FOR CCC

1. **Heat Balance Equation**
2. **Solar Heat Gain**
3. **Heat Loss By Radiation Of Conductor**
4. **Convection Heat Loss**
5. **Reynolds Number**
6. **Nusselt Number**
7. **DC Resistance at 75 Deg. C**
8. **AC Resistance at 75 Deg. C**
9. **Current Carrying Capacity**

## V. RESULTS
**Table I.** Current Carrying Capacity (Amps) For Acsr Zebra Conductor
D=28.62mm          Dc Resistance At 20°C = 0.068 Ω

| Ambient | 65 | 75 | 85 | 95 |
|---|---|---|---|---|
| 40 | 426.2925 | 535.8925 | 621.4389 | 692.5225 |
| 45 | 351.9431 | 480.9182 | 576.3169 | 653.678 |
| 50 | 257.1118 | 418.8955 | 527.4205 | 612.4266 |
| 55 | 91.7546 | 346.0083 | 473.5493 | 568.2183 |

**Table Ii.** Current Carrying Capacity (Amps) For Aaac Zebra Conductor
D=28.42mm          DC Resistance at 20°C = 0.069 Ω

| Ambient temperature | 65 | 75 | 85 | 95 |
|---|---|---|---|---|
| 40 | 422.5267 | 530.9998 | 615.678 | 686.0426 |
| 45 | 348.9456 | 476.5719 | 570.997 | 647.574 |
| 50 | 255.1486 | 415.1749 | 522.5823 | 606.7239 |
| 55 | 92.2435 | 343.0413 | 469.2472 | 562.9484 |

**Table Iii.** Current Carrying Capacity (Amps) For Acsr Moose Conductor
D=31.77mm DC Resistance at 20°C = 0.055 Ω

| Ambient temperature | 65 | 75 | 85 | 95 |
|---|---|---|---|---|
| 40 | 485.1945 | 612.7414 | 712.0892 | 794.5975 |
| 45 | 398.595 | 549.1014 | 659.9866 | 749.8094 |
| 50 | 287.1332 | 477.1353 | 603.4589 | 702.2085 |
| 55 | 77.9133 | 392.2319 | 541.0827 | 651.1478 |

**Table Iv.**Current Carrying Capacity (Amps) For Aaac Moose Conductor
D=31.07mm       DC Resistance at 20°C = 0.059 Ω

| Ambient temperature | 65 | 75 | 85 | 95 |
|---|---|---|---|---|
| 40 | 466.1387 | 588.0881 | 683.119 | 762.0514 |
| 45 | 383.3567 | 527.1717 | 633.2189 | 719.1429 |
| 50 | 277.0217 | 458.3203 | 579.0945 | 673.5475 |
| 55 | 81.1136 | 377.1607 | 519.3905 | 624.6479 |

## VI. CONCLUSION

As per the module which is given above, the calculation is done for current carrying capacity under various condition of different conductor.

## ACKNOLWEDGEMENT

## REFRENCES

[1].    Central Board of Irrigation and Power (CBIP) publication no.268

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