

BAB VI

KESIMPULAN DAN SARAN

6.1. Kesimpulan

Berdasarkan proses validasi yang diperoleh dari program bantu kolom segi empat ini, selisih absolut dari perbandingan program ini dengan hasil perhitungan manual adalah 0 % dan selisih absolut terbesar dari perbandingan program ini dengan program *SPColumn* adalah 0,347 %. Selisih perhitungan tersebut masih dapat dikatakan mendekati. Artinya program ini mempunyai tingkat ketelitian yang baik, sehingga program ini layak digunakan untuk melakukan analisis kolom uniaksial berdasarkan SNI 2847 : 2013.

Dari hasil penulisan tugas akhir dan pembangunan program ini, maka dapat ditarik beberapa kesimpulan :

1. Proses analisis kolom uniaksial secara manual memakan waktu yang lama sehingga dinilai tidak efisien.
2. Program bantu kolom persegi berdasarkan SNI 2847 : 2013 terbukti lebih akurat dan efektif daripada perhitungan secara manual.
3. Program ini praktis untuk digunakan karena tanpa harus mengunduh dan menginstalnya ke komputer.

6.2. Saran

Program bantu kolom segi empat berbasis *web* berdasarkan SNI 2847:2013 ini tentu masih jauh dari sempurna dan harus banyak mengalami penyempurnaan, diantaranya :

1. Membuat sistem penyimpanan data pada program, yang bisa memudahkan pengguna untuk meninjau ulang pekerjaan yang sudah pernah dilakukan.
2. Mengembangkan program ini dengan menambahkan beban biaksial dan kolom langsing sehingga program bantu kolom menjadi lebih lengkap.



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KODING PROGRAM JS-COLUMN

```
<!DOCTYPE html>
<html>
  <head>
    <title>Diagram Interaksi</title>
    <script src="js/Chart.bundle.js"></script>
    <script src="js/utlis.js"></script>
    <style>
      canvas {
        -moz-user-select: none;
        -webkit-user-select: none;
        -ms-user-select: none;
      }
    </style>
    <link rel="stylesheet" type="text/css" href="css/bootstrap.min.css">
    <script type="text/javascript" src="js/jquery-3.2.1.min.js"></script>
    <script type="text/javascript" src="js/bootstrap.min.js"></script>
    <script type="text/javascript" src="js/three.js"></script>
  </head>
  <body>

    <div class="container-fluid">
      <h1><i class="glyphicon glyphicon-th-list"></i> Diagram Interaksi
Kolom</h1>
      <div class="row">
        <div class="col-md-5">
          <div>
            <table align="center">
```

```

<!-- FORM -->
<tr>
  <td width="160">Mutu Beton fc' (MPa)</td>
  <td width="11">:</td>
  <td>
    <input type="number" id="fc" value="30" class="form-
control" placeholder="MPa">
  </td>
</tr>
<tr>
  <td>Mutu Baja fy (MPa)</td>
  <td>:</td>
  <td>
    <input type="number" id="fy" value="400" class="form-
control" placeholder="Mpa">
  </td>
</tr>
<tr>
  <td>Lebar b (mm)</td>
  <td>:</td>
  <td>
    <input type="number" id="b" value="300" class="form-
control" placeholder="mm">
  </td>
</tr>
<tr>
  <td>Tinggi h (mm)</td>
  <td>:</td>
  <td>
    <input type="number" id="h" value="300" class="form-
control" placeholder="mm">

```

```

        </td>
    </tr>
    <tr>
        <td>Selimut Beton (mm)</td>
        <td>:</td>
        <td>
            <input type="number" id="selimut" value="40"
class="form-control" placeholder="mm">
        </td>
    </tr>
    <tr>
        <td>Dia Tulangan (mm)</td>
        <td>:</td>
        <td>
            <input type="number" id="dtul" value="22" class="form-
control" placeholder="mm">
        </td>
    </tr>
    <tr>
        <td>Dia Sengkang (mm)</td>
        <td>:</td>
        <td>
            <input type="number" id="d_sengkang" value="10"
class="form-control" placeholder="mm">
        </td>
    </tr>
    <tr>
        <td>Jumlah Baris Tul. Arah x</td>
        <td>:</td>
        <td>

```

```

        <input type="number" id="nx" value="3" class="form-
control">

```

```

    </td>

```

```

</tr>

```

```

<tr>

```

```

    <td>Jumlah Baris Tul. Arah y</td>

```

```

    <td>:</td>

```

```

    <td>

```

```

        <input type="number" id="ny" value="3" class="form-
control">

```

```

    </td>

```

```

</tr>

```

```

        <td colspan = 3> <input class='btn btn-block btn-success'
type="button" onclick="hitung()" value="HITUNG"> </td>

```

```

    </tr>

```

```

</table>

```

```

</div>

```

```

</div>

```

```

<div class="col-md-3">

```

```

    <div id="info-hasil">

```

```

        <!-- RESULT -->

```

```

        <div class="alert alert-info" id="Beta1"></div>

```

```

        <div class="alert alert-info" id="rho"></div>

```

```

    </div>

```

```

</div>

```

```

<div class="col-md-4">

```

```

    <div id="penampang-cont"></div>

```

```

</div>

```

```

</div>

```



```
</div>
```

```
<!-- Menampilkan Input Pu dan Mux -->
```

```
<div class="row" id="plot-1">
```

```
<div id="canvas-cont" class = "col-md-6"></div>
```

```
<div id="plot-cont" class = "col-md-2">
```

```
    Pu (KN)<input type="number" name="" class="form-control"
id="input-plot-y">
```

```
    Mux (KN.m)<input type="number" name="" class="form-control"
id="input-plot-x">
```

```
        <button class="btn btn-info btn-block"
onclick="addPlot1()">PLOT</button>
```

```
</div>
```

```
</div>
```

```
<div id="table-cont"></div>
```

```
<!-- Menampilkan Input Pu dan Muy -->
```

```
<div class="row" id="plot-2">
```

```
<div id="canvas-cont2" class = "col-md-6"></div>
```

```
<div id="plot-cont" class = "col-md-2">
```

```
    Pu (KN)<input type="number" name="" class="form-control"
id="input-plot-y2">
```

```
    Muy (KN.m)<input type="number" name="" class="form-control"
id="input-plot-x2">
```

```
        <button class="btn btn-info btn-block"
onclick="addPlot2();">PLOT</button>
```

```
</div>
```

```
</div>
```

```
<div id="table-cont-2"></div>
```

```
</div>
```

```
<script type="text/javascript">
```

```
// HIDE THE PLOT
```

```
$(document).ready(function(){
```

```
    $("#plot-1").hide();
```

```
    $("#plot-2").hide();
```

```
    $("#info-hasil").hide();
```

```
});
```

```
var genData      = [];
```

```
var genData2      = [];
```

```
var penampangData = [];
```

```
var penampangBorder = [];
```

```
function hitung(){
```

```
    var fc = parseFloat(document.getElementById("fc").value);
```

```
    var fy = parseFloat(document.getElementById("fy").value);
```

```
    var dtul = parseFloat(document.getElementById("dtul").value);
```

```
    var nx = parseFloat(document.getElementById("nx").value);
```

```
    var ny = parseFloat(document.getElementById("ny").value);
```

```
    var b = parseFloat(document.getElementById("b").value);
```

```
    var h = parseFloat(document.getElementById("h").value);
```

```
    var selimut =
```

```
parseFloat(document.getElementById("selimut").value);
```

```
    var d_sengkang =
```

```
parseFloat(document.getElementById("d_sengkang").value);
```

// Nilai yang Ditetapkan

regUlt = 0.003;

Es = 200000;

ey = fy/Es;

// Beban aksial tekan maksimum

cy = selimut + d_senggang + 0.5*dtul;

cx = cy;

Ag = b*h;

n_tul = 2*nx+2*(ny-2);

Ast = n_tul*0.25*Math.PI*dtul*dtul;

rho = Ast/Ag *100;

Pnmax = (0.85*fc*(Ag-Ast)+Ast*fy)/1000;

Pnmaxijin = 0.8*Pnmax;

Pn = Pnmaxijin;

spasiy = (h-2*cy)/(ny-1);

spasix = (b-2*cx)/(nx-1);

jarak_bersih_y = spasiy-dtul;

jarak_bersih_x = spasix-dtul;

// Syarat Jarak Bersih yang Diiijinkan

if (1.5*dtul > 40)

{

 jarak_bersih_ijjin = 1.5*dtul

}

else

{

 jarak_bersih_ijjin = 40

```

    }

    if (jarak_bersih_y <= jarak_bersih_ijin )
    {
        alert("Jarak Bersih Tulangan Arah y Tidak Memenuhi Syarat
Minimal!");
    }

    if (jarak_bersih_x <= jarak_bersih_ijin)
    {
        alert("Jarak Bersih Tulangan Arah x Tidak Memenuhi Syarat
Minimal!");
    }

    // Syarat Rasio Tulangan

    if (rho < 1)
    {
        alert("Rasio Tulangan < 1% Tidak Memenuhi Syarat Minimum!")
    }
    else if (rho > 8)
    {
        alert("Rasio Tulangan > 8% Tidak Memenuhi Syarat Maksimum!")
    }

    // Syarat Beta1

    if (fc<=28)
    {
        Beta1 = 0.85;
    }

```

```

else if (fc > 58)
{
    Beta1 = 0.65;
}
else
{
    Beta1 = 0.85-((fc-28)/7)*0.05;
}

// Iterasi c untuk cari Mn

function Iterasi_c (Pn, ny, nx, h, b){
    xa = h*3;
    xb = 0;
    do
    {
        c = (xa+xb)/2;
        a = Beta1*c;
        if (a>h)
        {
            Ac = h*b;
            y0 = h/2;
        }
        else
        {
            Ac = a*b;
            y0 = a/2;
        }
        Cc = Ac*0.85*fc/1000;
        residu = -Cc + Pn;
        Mn = -Cc*y0;
    }
}

```

```

ytop = cy;
spasi = (h-2*cy)/(ny-1);
d = ytop + spasi * (ny-1);
i = 1;
for ( i==1; i<=ny; i++ )
{
    Y = ytop + spasi * (i-1);
    if (i==1 || i==ny)
    {
        Atul = 0.25*Math.PI*dtul*dtul*nx;
    }
    else
    {
        Atul = 2*0.25*Math.PI*dtul*dtul;
    }
    if (Y>=c)
    {
        esi = regUlt*(Y-c)/c;
        if (esi<(fy/Es))
        {
            fSteel = esi*Es;
        }else
        {
            fSteel = fy;
        }
        f = fSteel*Atul/1000;
    }
    else
    {
        esi = regUlt*(c-Y)/c;
        if (esi<(fy/Es)){

```

```

        fSteel = esi*Es;
    }else{
        fSteel = fy;
    }
    f = (fSteel-0.85*fc)*-Atul/1000;
}
residu = residu + f;
Mn = Mn + f*Y;
}
if (residu<0){
    xa = c
}else{
    xb = c
}
z = Math.abs(residu);
}while(z>=0.00000001);
Mn = (Mn + Pn*h/2)/1000;
et = Math.abs(((d - c)/c)*0.003);
if (et > 0.005){
    reduksi = 0.9
}else if (et <= ey){
    reduksi = 0.65
}else {
    reduksi = ((et-ey)*0.9+(0.005-et)*0.65)/(0.005-ey)
}
Pnred = Pn*reduksi;
Mnred = Mn*reduksi;
return {
    Mn    : Mn,
    Pnred : Pnred,
    Mnred : Mnred
}

```

```

    };
}

// Kondisi Balans

function kondisi_balans (ny, nx, h, b){

    ytop = cy;
    spasi = (h-2*cy)/(ny-1);
    d = ytop + spasi * (ny-1);
    c = 600/(600 + fy)*d;
    a = Beta1*c;
    if (a>h)
    {
        Ac = h*b;
        y0 = h/2;
    }
    else
    {
        Ac = a*b;
        y0 = a/2;
    }
    Cc = Ac*0.85*fc/1000;
    Pnb = -Cc;
    Mnb = -Cc*y0;
    i = 1;
    for ( i==1; i<=ny; i++ )
    {
        Y = ytop + spasi * (i-1);
        if (i==1 || i==ny)
        {

```



```

        Atul = 0.25*Math.PI*dtul*dtul*nx;
    }
    else
    {
        Atul = 2*0.25*Math.PI*dtul*dtul;
    }
    if (Y>=c)
    {
        esi = regUlt*(Y-c)/c;
        if (esi<(fy/Es))
        {
            fSteel = esi*Es;
        }else
        {
            fSteel = fy;
        }
        f = fSteel*Atul/1000;
    }
    else
    {
        esi = regUlt*(c-Y)/c;
        if (esi<(fy/Es)){
            fSteel = esi*Es;
        }else{
            fSteel = fy;
        }
        f = (fSteel-0.85*fc)*-Atul/1000;
    }
    Pnb = Pnb + f;
    Mnb = Mnb + f*Y;
}

```

```

Pnb = Math.abs(Pnb);
Mnb = (Mnb + Pnb*h/2)/1000;
return {
    Pnb : Pnb,
    Mnb : Mnb,
};
}

function generateXY(maxY, range, ny, nx, h, b){
    var result = [];
    var resultMnred = [];
    var resultBatas = [];
    var maxY2 = (maxY * 0.65);
    var Pnb = kondisi_balans (ny, nx, h, b).Pnb;
    var Mnb = kondisi_balans (ny, nx, h, b).Mnb;
    var dist1 = (maxY-Pnb) / range;
    var dist2 = Pnb / range;
    var dist3 = ((fy*Ast)/1000) / range;
    var x = 0.0;
    var y = maxY;
    var y2 = Pnb - dist2;
    var y3 = -dist3;
    var fulltarik = -(fy*Ast)/1000;

    resultBatas.push({
        x : 0.0,
        y : 0.0
    });

    resultBatas.push({
        x : parseFloat(Mnb),

```

```

        y : parseFloat(Pnb)
    });

    result.push({
        x : 0.0,
        y : parseFloat(maxY)
    });

    resultMnred.push({
        x : 0.0,
        y : parseFloat(maxY2)
    });

    for(var idx = 0; idx <= range; idx++){
        nilaix = parseFloat(Iterasi_c(y, ny, nx, h, b).Mn);
        nilaiy = parseFloat(y);
        nilaixMnr = parseFloat(Iterasi_c(y, ny, nx, h, b).Mnred);
        nilaiyPnr = parseFloat(Iterasi_c(y, ny, nx, h, b).Pnred);

        result.push({
            x : nilaix,
            y : nilaiy
        });

        resultMnred.push({
            x : nilaixMnr,
            y : nilaiyPnr
        });

        y = y - dist1;

```

```
}
```

```
for(var idx = 0; idx <= (range-1); idx++ ){
  nilaix = parseFloat(Iterasi_c(y2, ny, nx, h, b).Mn);
  nilaiy = parseFloat(y2);
  nilaixMnr = parseFloat(Iterasi_c(y2, ny, nx, h, b).Mnred);
  nilaiyPnr = parseFloat(Iterasi_c(y2, ny, nx, h, b).Pnred);

  result.push({
    x : nilaix,
    y : nilaiy
  });

  resultMnred.push({
    x : nilaixMnr,
    y : nilaiyPnr
  });

  y2 = y2 - dist2;
}
```

```
for(var idx = 0; idx <= (range-2); idx++ ){
  nilaix = parseFloat(Iterasi_c(y3, ny, nx, h, b).Mn);
  nilaiy = parseFloat(y3);
  nilaixMnr = parseFloat(Iterasi_c(y3, ny, nx, h, b).Mnred);
  nilaiyPnr = parseFloat(Iterasi_c(y3, ny, nx, h, b).Pnred);

  result.push({
    x : nilaix,
    y : nilaiy
```

```

});

resultMnred.push({
    x : nilaixMnr,
    y : nilaiyPnr
});

y3 = y3 - dist3;
}
result.push({
    x : 0.0,
    y : fulltarik
});

resultMnred.push({
    x : 0.0,
    y : fulltarik * 0.9
});

return {
    MnData : result,
    MnredData : resultMnred,
    BatasData : resultBatas,

};

}

genData = generateXY(Pn, 20, ny, nx, h, b);
genData2 = generateXY(Pn, 20, nx, ny, b, h);

```

```
// showTable(genData.MnredData, "#table-cont-mnr");
// showTable(genData.PnredData, "#table-cont-pnr");
```

```
$("#info-hasil").slideDown("slow");
//Generate gambar penampang
```

```
function TABEL(ny, nx, h, b){
    var tableData    = [];

    tableData.push({
        x: 0,
        y: (Pnmax*0.65).toFixed(4),
        ket: "Beban Konsentrik"
    });

    tableData.push({
        x: Iterasi_c(Pnmaxijin, ny, nx, h, b).Mnred.toFixed(4),
        y: Iterasi_c(Pnmaxijin, ny, nx, h, b).Pnred.toFixed(4),
        ket: "Beban Tekan Maksimum Ijin"
    });

    tableData.push({
        x: ((kondisi_balans(ny, nx, h, b).Mnb)*0.65).toFixed(4),
        y: ((kondisi_balans(ny, nx, h, b).Pnb)*0.65).toFixed(4),
        ket: "Kondisi Seimbang"
    });

    tableData.push({
        x: Iterasi_c(0, ny, nx, h, b).Mnred.toFixed(4),
        y: 0,
```

```

        ket: "Momen Lentur Murni"
    });

    tableData.push({
        x: 0,
        y: (-(fy*Ast)/1000 *0.9).toFixed(4),
        ket: "Beban Tarik Maksimum"
    });
    return {tableData};
}

data_y = TABEL(nx,ny,b,h);
data_x = TABEL(ny,nx,h,b);
showTable(data_x.tableData, "#table-cont");
showTable(data_y.tableData, "#table-cont-2");
showScatter_1();
showScatter_2();
generatePenampang(b, h, nx, ny);
showScatterPenampang(b, h, dtul);

document.getElementById("rho").innerHTML+"&rho; =
"+rho.toFixed(4)+"%";
document.getElementById("Beta1").innerHTML+"&beta;1 =
"+Beta1.toFixed(4);
document.getElementById("plot-cont").innerHTML = plot-cont;
}

var color = Chart.helpers.color;
function showScatter_1() {
    //alert(JSON.stringify(genData));
    var canvasCont = document.getElementById("canvas-cont");

```

```

canvasCont.innerHTML = "";
var canvas = document.createElement('canvas');
var att = document.createAttribute("height");
att.value = 300;
canvas.setAttributeNode(att);
canvasCont.appendChild(canvas);
var ctx = canvas.getContext("2d");
window.myScatter1 = Chart.Scatter(ctx, {
  data: {
    datasets: [{
      label: "Mn",
      borderColor: window.chartColors.blue,
      backgroundColor:
color(window.chartColors.blue).alpha(0.0).rgbString(),
      lineTension : 0,
      data: genData.MnData
    },
    {
      label: "MnRed",
      borderColor: window.chartColors.red,
      backgroundColor:
color(window.chartColors.red).alpha(0.0).rgbString(),
      lineTension : 0,
      data: genData.MnredData
    },
    {
      label: "Batas",
      borderColor: window.chartColors.yellow,
      backgroundColor:
color(window.chartColors.yellow).alpha(0.0).rgbString(),
      data: genData.BatasData,

```



```

        borderDash: [5,10]
    },
    {
        label: "Plot",
        borderColor: window.chartColors.purple,
        backgroundColor:
color(window.chartColors.purple).alpha(0.0).rgbString(),
        pointRadius: 5,
        pointHoverRadius: 5,
        showLine: false, // no line shown
        data: []
    }
],
},
options: {
    title: {
        display: true,
        text: 'Diagram Interaksi Sumbu X'
    },
    elements: {
        point: {
            radius: 0
        }
    },
    legend: {
        display: false
    },
},
});

$("#plot-1").fadeIn();

```

```

}

function showScatter_2() {
    //alert(JSON.stringify(genData));
    var canvasCont = document.getElementById("canvas-cont2");
    canvasCont.innerHTML = "";
    var canvas = document.createElement('canvas');
    var att = document.createAttribute("height");
    att.value = 300;
    canvas.setAttributeNode(att);
    canvasCont.appendChild(canvas);
    var ctx = canvas.getContext("2d");
    window.myScatter2 = Chart.Scatter(ctx, {
        data: {
            datasets: [{
                label: "Mn",
                borderColor: window.chartColors.blue,
                backgroundColor:
color(window.chartColors.blue).alpha(0.0).rgbString(),
                lineTension : 0,
                data: genData2.MnData
            },
            {
                label: "MnRed",
                borderColor: window.chartColors.red,
                backgroundColor:
color(window.chartColors.red).alpha(0.0).rgbString(),
                lineTension : 0,
                data: genData2.MnredData
            },
            {

```

```

        label: "Batas",
        borderColor: window.chartColors.yellow,
        backgroundColor:
color(window.chartColors.yellow).alpha(0.0).rgbString(),
        data: genData2.BatasData,
        borderDash: [5,10]
    },
    {
        label: "Plot",
        borderColor: window.chartColors.purple,
        backgroundColor:
color(window.chartColors.purple).alpha(0.0).rgbString(),
        pointRadius: 5,
        pointHoverRadius: 5,
        showLine: false, // no line shown
        data: []
    }
]
},
options: {
    title: {
        display: true,
        text: 'Diagram Interaksi Sumbu Y'
    },
    elements: {
        point: {
            radius: 0
        }
    }
},
});

```

```

$("#plot-2").fadeIn();
}

```

```

function showTable(theData, target){
    result = "<table class='table table-
striped'><thead><tr><th>Keterangan</th><th>Pn</th><th>Mn</th></tr></thead>
<tbody>";
    for(var idx = 0; idx < theData.length; idx++)
    {
        result += "<tr><td>" + theData[idx].ket + "</td><td>" + theData[idx].y
+ "</td><td>" + theData[idx].x + "</td></tr>";
    }
    result += "</tbody></table>";

    $(target).html(result);

    return result;
}

```

```

function addPlot1(){
    window.myScatter1.data.datasets[3].data.push({
        x : Math.abs(parseFloat($("#input-plot-x").val())),
        y : parseFloat($("#input-plot-y").val())
    });
    window.myScatter1.update();
}

```

```

function addPlot2(){
    window.myScatter2.data.datasets[3].data.push({

```

```

        x : Math.abs(parseFloat($("#input-plot-x2").val())),
        y : parseFloat($("#input-plot-y2").val())
    });
    window.myScatter2.update();
}

function generatePenampang(b, h, x, y){
    penampangData.splice(0, penampangData.length);
    penampangBorder.splice(0, penampangBorder.length);
    var x0 = -0.5*b+cx;
    var y0 = -0.5*h+cy;
    for(var i = 0; i < y; i++){
        if(i == 0 || i == (y - 1)){
            for(var j = 0; j < x; j++){

                penampangData.push({
                    y: y0+i*spasiy,
                    x: x0+j*spasix
                });
            }
        }else{
            penampangData.push({y: y0+i*spasiy, x: x0});
            penampangData.push({y: y0+i*spasiy, x: x0+(x-1)*spasix});
        }
    }
}

penampangBorder = [
    {x: -0.5*b, y: -0.5*h},
    {x: -0.5*b, y: 0.5*h},
    {x: 0.5*b, y: 0.5*h},
    {x: 0.5*b, y: -0.5*h},

```

```

    {x: -0.5*b, y: -0.5*h}
  ];

  //alert(JSON.stringify(penampangData));
}

function showScatterPenampang(b, h, dtul){
  //alert(JSON.stringify(genData));
  if (b>h){
    maks = b
  }else{
    maks = h
  }
  var canvasCont = document.getElementById("penampang-cont");
  canvasCont.innerHTML = "";
  var canvas = document.createElement('canvas');
  var attH = document.createAttribute("height")
  var attW = document.createAttribute("width");
  attW.value = attH.value = 50;
  canvas.setAttributeNode(attW);
  canvas.setAttributeNode(attH);
  canvasCont.appendChild(canvas);
  var ctx = canvas.getContext("2d");
  window.myScatterPenampang = Chart.Scatter(ctx, {
    data: {
      datasets: [{
        label: "Border",
        borderColor: window.chartColors.blue,
        backgroundColor:
color(window.chartColors.blue).alpha(0.0).rgbString(),
        lineTension: 0,

```

```

        data: penampangBorder
    },
    {
        label: "Plot",
        borderColor: window.chartColors.purple,
        backgroundColor:
color(window.chartColors.purple).alpha(0.0).rgbString(),
        pointRadius: (dtul/5),
        pointHoverRadius: 5,
        showLine: false, // no line shown
        data: penampangData
    }
]
},
options: {
    title: {
        display: false,
        text: 'Tampang'
    },
    elements: {
        point: {
            radius: 0
        }
    },
    scales: {
        xAxes: [{
            display: false,
            ticks: {
                min: -maks,
                max: maks,
                stepSize: 100,

```

```
        fixedStepSize: 100,  
      },  
    },  
    yAxes: [{  
      display: false,  
      ticks: {  
        min: -maks,  
        max: maks,  
        stepSize: 100,  
        fixedStepSize: 100,  
      },  
    },  
  ],  
  },  
  legend: {  
    display: false  
  },  
},  
});  
}  
</script>  
</body>  
</html>
```

