

plotTDKCharField

Explore TDK TAS2141 characterization field.

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Syntax

plotTDKCharField()

Description

plotTDKCharField() explore characterization field of TDK sensor.

Examples

plotTDKCharField();

Input Arguments

None

Output Arguments

None

Requirements

- Other m-files: none
- Subfunctions: none
- MAT-files required: data/TDK_TAS2141_Characterization_2020-10-22_18-12-16-827.mat, data/config.mat

See Also

- [plotTDKCharDataset](#)

Created on October 28, 2020 by Tobias Wulf. Copyright Tobias Wulf 2020.

```
function plotTDKCharField()
    try
        % load dataset path and dataset content into function workspace
        load('config.mat', 'PathVariables');
        load(PathVariables.tdkDatasetPath, 'Data', 'Info');
        close all;
    catch ME
        rethrow(ME)
    end

    % load needed data from dataset in to local variables for better handling %%
    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
    % get from user which field to investigate and limits for plateau
    fields = Info.SensorOutput.CosinusBridge.Determination;
    nFields = length(fields);
    fprintf('Choose 1 of %d fields ...\n', nFields);
    for i = 1:nFields
```

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        fprintf('%s\t:\t(%d)\n', fields{i}, i);
    end

    iField = input('Choice: ');
    field = fields{iField};
    pl = input('Plateu limit in kA/m: ');

    Vcos = Data.SensorOutput.CosinusBridge.(field);
    Vsin = Data.SensorOutput.SinusBridge.(field);
    gain = Info.SensorOutput.BridgeGain;
    HxScale = Data.MagneticField.hx;
    HyScale = Data.MagneticField.hy;
    Hmin = Info.MagneticField.MinAmplitude;
    Hmax = Info.MagneticField.MaxAmplitude;

    % get unit strings from
    kApm = Info.Units.MagneticFieldStrength;
    mV = Info.Units.SensorOutputVoltage;

    % get dataset infos and format strings to place in figures
    % subtitle string for all figures
    infoStr = join([Info.SensorManufacturer, Info.Sensor, Info.SensorTechnology, ...
        Info.SensorType, "Sensor Characterization Dataset."]);
    dateStr = join(["Created on", Info.Created, "by", 'Thorben Sch\uthe', ...
        "and updated on", Info.Edited, "by", Info.Editor + "."]);

    % clear dataset all loaded
    clear Data Info;

    % figure save path for different formats %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
    fName = sprintf("tdk_char_field_%s", field);
    fPath = fullfile(PathVariables.saveFiguresPath, fName);
    fSvgPath = fullfile(PathVariables.saveImagesPath, 'svg', fName);
    fEpsPath = fullfile(PathVariables.saveImagesPath, 'eps', fName);
    fPdfPath = fullfile(PathVariables.saveImagesPath, 'pdf', fName);

    % define slices and limits to plot %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
    Hslice = [128 154 180 205]; % hit ca. 0, 5, 10, 15 kA/m
    Hlims = [-pl pl];
    mVpVlims = [-175 175];

    % create figure for plots %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
    fig = figure('Name', 'Char Field', ...
        'NumberTitle', 'off', ...
        'WindowStyle', 'normal', ...
        'MenuBar', 'none', ...
        'ToolBar', 'none', ...
        'Units', 'centimeters', ...
        'OuterPosition', [0 0 33 30], ...
        'PaperType', 'a4', ...
        'PaperUnits', 'centimeters', ...
        'PaperOrientation', 'landscape', ...
        'PaperPositionMode', 'auto', ...
        'DoubleBuffer', 'on', ...
        'RendererMode', 'manual', ...
        'Renderer', 'painters');

    tdl = tiledlayout(fig, 2, 2, ...
        'Padding', 'compact', ...
        'TileSpacing', 'compact');

    title(tdl, sprintf('Characterization Field: %s', field), ...
        'FontWeight', 'normal', ...
        'FontSize', 18, ...
        'FontName', 'Times', ...
        'Interpreter', 'latex');

    subtitle(tdl, [infoStr; dateStr], ...

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        'FontWeight', 'normal', ...
        'FontSize', 14, ...
        'FontName', 'Times', ...
        'Interpreter', 'latex');

% set colormap
colormap('jet');

% cosinus bridge %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
nexttile(1);
im = imagesc(HxScale, HyScale, Vcos);
set(gca, 'YDir', 'normal');
set(im, 'AlphaData', ~isnan(Vcos));
yticks(xticks);
axis square xy;
grid on;

% plot lines for slice to investigate
hold on;
for i = Hslice
    yline(HyScale(i), 'k:', 'LineWidth', 2);
end
hold off;

xlabel(sprintf('$H_x$ in %s', kApm), ...
        'FontWeight', 'normal', ...
        'FontSize', 12, ...
        'FontName', 'Times', ...
        'Interpreter', 'latex');

ylabel(sprintf('$H_y$ in %s', kApm), ...
        'FontWeight', 'normal', ...
        'FontSize', 12, ...
        'FontName', 'Times', ...
        'Interpreter', 'latex');

title('$V_{cos}(H_x, H_y)$', ...
        'FontWeight', 'normal', ...
        'FontSize', 12, ...
        'FontName', 'Times', ...
        'Interpreter', 'latex');

cb = colorbar;
cb.Label.String = sprintf('$V_{cos}(H_x, H_y)$ in %s, Gain $ = %.1f$', mV, gain);
cb.Label.Interpreter = 'latex';
cb.Label.FontSize = 12;

% cosinus bridge sclices %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
nexttile(2);
% slices
p = plot(HxScale, Vcos(Hslice,:), 'LineWidth', 1.2);

% plateau limits
if pl > 0
    hold on;
    xline(Hlims(1), 'k-.', 'LineWidth', 1.5);
    xline(Hlims(2), 'k-.', 'LineWidth', 1.5);
    hold off;

    text(Hlims(1)-9.5, 100, ...
        sprintf('$.1f$ %s', Hlims(1), kApm), ...
        'Color', 'k', ...
        'FontSize', 12, ...
        'FontName', 'Times', ...
        'Interpreter', 'latex');

    text(Hlims(2)+0.5, -50, ...
        sprintf('$.1f$ %s', Hlims(2), kApm), ...
        'Color', 'k', ...

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        'FontSize', 12, ...
        'FontName', 'Times', ...
        'Interpreter', 'latex');
end

legend(p, {'$H_y \approx 0$ kA/m', ...
           '$H_y \approx 5$ kA/m', ...
           '$H_y \approx 10$ kA/m', ...
           '$H_y \approx 15$ kA/m'}, ...
       'FontWeight', 'normal', ...
       'FontSize', 9, ...
       'FontName', 'Times', ...
       'Interpreter', 'latex', ...
       'Location', 'SouthEast');

xlabel(sprintf('$H_x$ in %s', kApm), ...
       'FontWeight', 'normal', ...
       'FontSize', 12, ...
       'FontName', 'Times', ...
       'Interpreter', 'latex');

title('$V_{\cos}(H_x, H_y)$ for $H_y = $ const.', ...
      'FontWeight', 'normal', ...
      'FontSize', 12, ...
      'FontName', 'Times', ...
      'Interpreter', 'latex');

grid on;
ylim(mVpVlims);
xlim([Hmin Hmax])

% sinus bridge %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
nexttile(3);
im = imagesc(HxScale, HyScale, Vsin);
set(gca, 'YDir', 'normal');
set(im, 'AlphaData', ~isnan(Vsin));
yticks(xticks);
axis square xy;
grid on;

% plot lines for slice to investigate
hold on;
for i = Hslice
    xline(HxScale(i), 'k:', 'LineWidth', 2);
end
hold off;

xlabel(sprintf('$H_x$ in %s', kApm), ...
       'FontWeight', 'normal', ...
       'FontSize', 12, ...
       'FontName', 'Times', ...
       'Interpreter', 'latex');

ylabel(sprintf('$H_y$ in %s', kApm), ...
       'FontWeight', 'normal', ...
       'FontSize', 12, ...
       'FontName', 'Times', ...
       'Interpreter', 'latex');

title('$V_{\sin}(H_x, H_y)$', ...
      'FontWeight', 'normal', ...
      'FontSize', 12, ...
      'FontName', 'Times', ...
      'Interpreter', 'latex');

cb = colorbar;
cb.Label.String = sprintf('$V_{\sin}(H_x, H_y)$ in %s, Gain $ = %.1f$', mV, gain);
cb.Label.Interpreter = 'latex';
cb.Label.FontSize = 12;

```

```

% sinus bridge sclices %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
nexttile(4);
% slices
p = plot(HxScale, Vsin(:,Hslice), 'LineWidth', 1.2);

% plateau limits
if pl > 0
    hold on;
    xline(Hlims(1), 'k-.', 'LineWidth', 1.5);
    xline(Hlims(2), 'k-.', 'LineWidth', 1.5);
    hold off;

    text(Hlims(1)-9.5, 100, ...
        sprintf('$.1f$ %s', Hlims(1), kApm), ...
        'Color', 'k', ...
        'FontSize', 12, ...
        'FontName', 'Times', ...
        'Interpreter', 'latex');

    text(Hlims(2)+0.5, -50, ...
        sprintf('$.1f$ %s', Hlims(2), kApm), ...
        'Color', 'k', ...
        'FontSize', 12, ...
        'FontName', 'Times', ...
        'Interpreter', 'latex');
end

legend(p, {'$H_x \approx 0$ kA/m', ...
    '$H_x \approx 5$ kA/m', ...
    '$H_x \approx 10$ kA/m', ...
    '$H_x \approx 15$ kA/m'}, ...
    'FontWeight', 'normal', ...
    'FontSize', 9, ...
    'FontName', 'Times', ...
    'Interpreter', 'latex', ...
    'Location', 'SouthEast');

xlabel(sprintf('$H_y$ in %s', kApm), ...
    'FontWeight', 'normal', ...
    'FontSize', 12, ...
    'FontName', 'Times', ...
    'Interpreter', 'latex');

title('$V_{sin}(H_x, H_y)$ for $H_x = $ const.', ...
    'FontWeight', 'normal', ...
    'FontSize', 12, ...
    'FontName', 'Times', ...
    'Interpreter', 'latex');

grid on;
ylim(mVpVlims);
xlim([Hmin Hmax])

% save results of figure %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
yesno = input('Save? [y/n]: ', 's');
if strcmp(yesno, 'y')
    savefig(fig, fPath);
    print(fig, fSvgPath, '-dsvg');
    print(fig, fEpsPath, '-depsc', '-tiff', '-loose');
    print(fig, fPdfPath, '-dpdf', '-loose', '-fillpage');
end
close(fig)

end

```

