

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

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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], ...
    'FontWeight', 'normal', ...

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        '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 slices %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
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', ...
        'FontSize', 12, ...

```

[illegible]

```

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
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

```