- **A) Cross section of the BSCCO 2223/Ag tape of the Long Island · Very detailed conductor geometry** • **Very detailed conductor geometry** \bullet Very detailed conductor geometry **detailed** corruption geometry flux flux flow resistance (transport current density density exceeding conductor denoming critical current density exceeding conductor denoming can be a current density of the current density of the current density of the **B) Superconductor thin, plate-like grains in the filaments. Origination of the gradier of the gradier in Tube and Separate in Tube and Separate in Tube and Separate in Tu at t = 6.5 ms results from a sudden increase of transport current to a** *a* **fault (20 times over the current over the current of** α **increase of** α **in** \bullet Very detailed conductor geometry
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• Convergence of the Finite Element calculation scheme • Convergence of the Finite Element calculation scheme **of the up to 30 k Finite Elements. Only the left half of the total tape • Convergence of the Finite Element calculation s How to numerically model the hierarchy of grains,** Problem: A convergence of the Finite Flement calculation scheme
Problem: A convergence of the Finite Flement calculation scheme • Convergence of the Finite Element calculation scheme **Convergence of the Finite Element calculation scheme rigorous scattering theory. The Meissner effect is simulated in each Convergence of the Finite Element calculation scriente Convergence • Convergence of the Finite Element calculation scheme**

Harald Reiss Harald Reiss **Carald Reiss Harald Reiss Exercise Section of the BSCCO 222 Harald Reiss** Providence and the March 2016 National Providence and the March 2016 National Providence and Taylor 2017 University of Wuerzburg, Department of Physics, D-97074 Wuerzburg, Germany **Cable superconductor (Source: Nexans). One tape contains 91** conductor (Source: Nexans). One tape contains 91 identical filaments each composed of fine superconductor \blacksquare **A) Cross section of the BSCCO 2223/Ag tape of the Long Island Cable superconductor (Source: Nexans). One tape contains 91 grains; filaments and grains are embedded in a Ag-matrix material. The tapes are switched in parallel to the total the total, and the total the total to yield the total the total, and in parallel the total terms of the total terms of the total,** $\frac{1}{2}$ **and** $\frac{1}{2}$ **and \frac{1 A)** Cross Section of the BSCCO 222 Section of the BSCCO 222 Section of the BSCCO 222 Section of the Long Island Cable super **A) Cross section of the BSCCO 2223/Ag tape of the Long Island** University of Wuerzburg, Department of Physics, D-97074 Wuerzburg, Germany **Carald Reiss**

harald.reiss@physik.uni-wuerzburg.de harald.reiss@physik.uni-wuerzburg.de horold roice@phyoil uni wu erzhure do **identical filaments each composed of fine superconductor material. The tapes are switched in parallel to yield the total,** raiu.rciss@priysin.urii-wucizburg.uc horold rojee@phyeik uni wuorzhu composed of fine superconductor grains; filaments and grains are embed **A) Cross section of the BSCCO 2223/Ag tape of the Long Island** rald reiss@nhysik uni-wuerzhurg de material. The tape of α is the tapes with the total to the total, α **A) A) CROSECTION OF THE BUILD OF THE BUILD OF THE BUILD CAPE OF THE BUILD CAPE CAPE AND** $\bm{{\mathsf{h}}}$ arald.reiss $\bm{{\omega}}$ physik.uni-wuerzburg.de **A) Cross section of the BSCCO 2223/Ag tape of the Long Island grains; filaments and grains are embedded in a Ag-matrix material. The tapes with the total terms** in parallel to the total to your the total to your total the total to **Dimensions: x ≤ 280 µm (filament) and about 3.8 mm (total tape width), and y ≤ 30 µm (filament) and y = 250 to 300 µm** $\sum_{i=1}^n \sum_{i=1}^n \sum_{j=1}^n \sum_{j=$ **108 K, at 200 K, and i** $\frac{1}{2}$ $B = B - B - B - B - B - B$ **material. The tapes are switched in parallel to yield the total, marald.reiss@physik.uni-wuerzburg.de Dimensions: x ≤ 280 µm (filament) and about 3.8 mm (total** harald.reiss@physik.uni-wuerzburg.de **(total tape thickness). Critical temperature of BSCCO 2223 is** $\textsf{hargld}.\textsf{reiss}\textcircled{y} \textsf{physik}.\textsf{uni-wuerz} \textsf{b} \textsf{t}$ harald, reiss@physik, uni-wuerzburg, de $\textsf{parallel}.\textsf{reiss}\textcircled{x} \textsf{phys} \textsf{IK}.\textsf{uni-wuer} \textsf{z} \textsf{burg}.\textsf{de}$ **superconductor Cable (Source: Nexans). One tape contains 91 identical filaments each composed of fine superconductor material. tapes The are switched in parallel to yield the total,** raid.reiss@priysik.urii-wuerzpurg.ue S^{S} ricialus; filaments and grains and grains in the superconductor β

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B) Superconductor thin, plate-like grains in the filaments.

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Strongly different materials transport properties (electrical, thermal),
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apply A lotal = ACond + ARad, with radiative conductivity, ARad, using wave length dependent extinction properties obtained from application of rigorous scattering theory. The ivielssher effect is simulated in each of the to 30 K Finite Elements. Only the left half of the total tape width is shown. I be the interpretation of the Meissner effect is simulated in each of the up **Flements. Only the left half of the total tape width is shown. identified from the horizontal bar at the bottom of this figure** b) scattering theory. The Meissner effect is simulated in each of the up
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> tape under a strong disturbance. Local temperatures are identified from the **resistance in the mate indication of this figure (temperature steps of 2 K). In this** Transient temperature distribution (detail) within filaments, Ag-matrix and Figure, the losses arise from flux flow resistance (later, when locally T > 108 K, followed by Ohmic resistances). Thin white lines indicate overall filament Transient temperature distribution (detail) within filaments. Ag-matrix and tape under a strong disturbance. Local temperatures are identified from the horizontal bar at the bottom of this figure (temperature steps of $2 K$). In this Figure, the losses arise from flux flow resistance (later, when locally $T > 108$) K, followed by Ohmic resistances). Thin white lines indicate overall filament **D)** Transient temperature distribution (detail) within filaments, Ag-matrix and rape under a strong disturbance. Local temperatures are identified from the **(temperature steps of 2 K). In this Figure, the losses arise from flux figure, the losses anse from liux llow resistance (later, when locally T > 108 r**, iollowed by Onmic resistances). Thin white lines indicate overall illament control in the contours of the conto **The Figure clearly shows that superconductor temperature, within** the filaments, is NOT homogeneous. The symbol MX identifies the position tape under a strong disturbance. Local temperatures are identified from the Figure, the losses arise from flux flow resistance (later, when locally $T > 108$ K, followed by Ohmic resistances). Thin white lines indicate overall filament contours. The Figure clearly shows that superconductor temperature, within the filaments, is NOT homogeneous. The symbol MX identifies the position fit temperature distribution (detail) within inaments, Ag-matrix and conductor cross section, since α Figure in $\frac{1}{2}$ anse from hux now resistance (rater, when locally $1 \geq 100$ σ maniems, is two renormalizations. The symbol magnetics the position tape under a strong disturbance. Local temperatures are identified Transient temperature distribution (detail) within filaments. Ag-matrix and Transient temperature distribution (detail) within filaments, Ag-matrix and tape under a strong disturbance. Local temperatures are identified from the Figure, the losses arise from flux flow resistance (later, when locally T > 108 Transient temperature distribution (detail) within filaments. Ag-matrix and $\frac{1}{2}$ face under a strong disturbance. Local temperatures are identified from the horizontal bar at the bottom of this figure (temperature steps of $2 K$). In this Figure, the losses arise from flux flow resistance (later, when locally $T > 108$ K. followed by Ohmic resistances). Thin white lines indicate overall filament

B) B) Resistive states and current limitation, as they depend on local te **CIUSIONS**

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• **COMPS Problem: How to numerically model the hierarchy of grains, ORIGINATION** • Resistive states and current limitation, as they depend on local temperature **manufacturing process. The cannot be reduced by the cannot be reduced by the cannot be reduced by the constant of the constan How How to annot be h**
cannot be h **Pesistive states and current limitation** as they denend on local temperature **s Trans** coexist, side by side, not permanently, in the conductor cross section **Results and Conclusions** • **Resistive states and current imitiation**, as they depend on local temperature, and cannot be homogeneous, but flux flow resistive and Ohmic resistive states will a temp
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cannot be homogeneous, but flux flow resistive and Ohmic resistive states will
cannot be homogeneous, but flux flow resistive and Ohmic resistive states will temper side by side not permanently in the conductor cross section sity), later (bottom diagram) for the control of \mathcal{G} , and \mathcal{G} is one losses. Calculation in the calculation of \mathcal{G} , and \mathcal{G} is one losses. Calculation in the calculation of \mathcal{G} , and \mathcal{G} is coexist, side by side, not permanently, in the conductor cross section • **Convergence of the Finite Element calculation scheme** e Resistive states and distribution coexist, side by side, not permanently, in the conductor cross section extended fault transport current density experiment density experiment density extending to the conductor cross section • **Radiation heat transfer within the grains Results and Conclusions**

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University of Wuerzburg, Department of Physics, D-97074 Wuerzburg, Germany U **A) Cross section of the BSCCO 2223/Ag tape of the Long Island** g, Department of Physics, D-97074 Wuerzburg, Germar **A)** Cross section of the BSCCO 2223/Ag tape of the Long Island Cable super Γ **j, Departifient of Filysics, D-97074 vvuerzuurg, Germa**n **C) Numerical (Finite Element) simulation of transient temperature fields, T(x,y,t), in a single multi-filamentary, superconductor tape, at C)** Numerical (Finite Element) simulation of transient temperature fields, The single multiple m and 8.6 ms (from top to bottom). The disturbance starting at t = 6.5 ms re harald.reissa.reissa.
1980 – Johann Harald.reissa. **Cable superconductor (Source: Nexans). One tape contains 91** University of Wuerzburg, Department of Ph **material in the tape in the tapes in parallel in the tapes of the total in the total in parallel to the total in the multi-filamentary superconductor cable cross section. Dimensions: x ≤ 280 µm (filament) and about 3.8 mm (total tape width), and y ≤ 30 µm (filament) and y = 250 to 300 µm** \sim total, multi-filamentary superconductor cable conductor 2. Department of Physics, D-97074 ment) and y = 250 to 300 to 300 km (total tape thickness). Critical temperature of thickness, and the state of
The state of the state temperature of the state of the sta \mathbf{h} purg, Department or Friysics, D-97074 V multimartmant of Physics D-07074 Wuarzhurg Carms **Dimensions: x ≤ 280 µm (filament) and about 3.8 mm (total** \mathbf{c} ded in a agarmatic material. The tapes are so in parallel to the tapes are so in parallel to yield the to yiel total, multi-filamentary superconductor cable cross section. Dimensions: x ≤ **Cable 3** University of Wuerzburg Department **identical filaments each composed of fine superconductor** Harald Reiss
Hueroity of Wuerzburg. Deportment of Dhypieg **identical filaments each composed of fine superconductor g**, Department of Physics, D-97074 Wuerzburg, Germar **A)** Cross section of the BSCCO 2223/Ag tape of the Long Island Cable superconductor

undesirable, sudden phase transition from its superconducting to normal conducting state. Quench proceeds on very small timescales (ms and below) and may lead to local damage or even to destruction of the superconquetor. Contrary to standard stability models, the present paper considers the impact of local position and intensity of disturbances on superconductor stability (local liux liow and Onlinic resistance losses). A superconductor is stable if it does not quench, which means if it under a disturbance does not perform a most conductor. Contrary to standard stability models, the present paper considers the impact of local position and intensity of disturbances on superconductor stability (local flux flow and Ohmic resistance losses). **The second gashen, much meand in tensor a side sense accomponent a moot**
A transition from its superconducting to normal conducting state. Quench proceeds **Dimensions: x ≤ 280 µm (filament) and about 3.8 mm (total tape width), and y ≤ 30 µm (filament) and y = 250 to 300 µm Dimensions: x ≤ 280 µm (filament) and about 3.8 mm (total** total, multi-filamentary superconductor cable cross section. Dimensions: x ≤ (ms and below) and may lead to local damage or even to destruction of the superndard stability models, the present paper considers the impact of local position and 2 m it dood not quonon, windi modificant in andor a di se transition from its superconducting to normal co e if it does not quench, which means if it under a disturbance does not perform a most a transition from its superconducting to normal conductin andiviron from its supersonudshing to nomial sonudshin
, escales (ms and below) and may lead to local damage or even to destruction of the super-**(total tape thickness). Critical temperature of BSCCO 2223 is** nsition from its superconducting to normal conducting state. Quench proceeds **108 Superconductor stability (local flux** ded in a Ag-matrix material. The tapes are switched in parallel to yield the tapes are switched in parallel to total, multi-filamentary superconducting to normal co $\frac{1}{2}$ = 250 to 300 km (total tape thickness). Concernsion to 300 km (total tape thickness). Critical temperature of the set of th andard stability models, the present paper considers the impact of local position and Λ cuperconductor is stable if it dees not quench which means if it under a disturbance intensity of disturbances on superconductor stability (local flux flow and Ohn **B)** Superconductor the filam intensity of disturbances on superconductor stability (local flux flow and Ohmic resistance losses). **Orientation of the grains results from a Powder in Tube** comparison density of α current density α curren **diagram) followed by Ohmic resistance losses. Calculations apply** *λ* **and** α **a rigorous scattering theory. The Meissner effect is simulated in each** sity), later (bottom diagram) followed by Ohmic resistance losses. Calculati \Box a most and \Box and \Box with radiative conductivity, \Box with \Box using \Box using \Box using \Box with \Box with wave length dependent extinction properties obtained from application of ri gorous scattering theory. The Meissner effect is simulated in each of the up on very small timescales (ms and below) and may lead to local damage or even to destruction of the super $u_1, u_2, u_3, u_4, u_5, u_6, u_7, u_8, u_9, u_{10}, u_{11}, u_{12}, u_{13}, u_{14}, u_{15}, u_{16}, u_{17}, u_{18}, u_{19}, u_{10}, u_{11}, u_{12}, u_{13}, u_{14}, u_{15}, u_{16}, u_{17}, u_{18}, u_{19}, u_{10}, u_{11}, u_{12}, u_{13}, u_{14}, u_{15}, u_{16}, u_{17}, u_{18}, u_{19}, u_{10}, u_{11}, u_{12}, u_{13}, u_{14}, u_{15}, u_{16$ on a superconductor is stable if it does not querich, which means if it under a disturbance do undesirable, sudden phase transition from its superconducting to normal conducting sta
An using amall timescaples (me and belaus) and may lead to local democra ar aven to dea on very sinan innesearcs (ins and below) and may read to local damage or even **identical filaments each composed of fine superconductor gravited in a station in a Station in a Age of the Gravited in a Age of the Compton in a Age of the Compton in Age of the Compton in a Age of the Com** conductor. Contrary to standard stability models, the prese **(total tape thickness). Critical temperature of BSCCO 2223 is** A superconductor is stable if it does not quench which mea **Dimensions:** *and* about 3.8 mm (total about 3.8 mm engine) and about 3.8 mm engine 3.8 mm eng intensity of disturbances on superconductor stability (local flux flow and Ohmic resistance losses). ded in a superformation. The tapes are shown in the tapes are shown in parallel to yield the tapes \sim and y sindi welasted the second temperature of the second temperature of α **10es not quench, which mearly** of the super-
 C fields, T(x,y,t), in a single multi-filamentary, superconductor tape, at t and the set of the disturbance starting of the disturbance starting α **both** α **both a fault (20 times increase over nominal transport current, within 2.5** Se transition from its superconducting to normal conducting state. Quench proceeds
(me.grad.belaw) and may lead to leagl demage ar aven to destruction of the auper The super-filament multiple m and 8.6 ms (from top to bottom). The disturbance starting at t = 6.5 ms re \sim surface of transport current to a fault (20 times increase of transport current to a fault (20 times increase of the set of the istance losses). Losses initially arise from α single multi-filamentary arise from α α if it does not quench which means if it under a disturben. **u** it about the quotion, writical triband in territor a distancement does not quench, which means if it ur C) Numerical position direction of the Element of the E conductor. Contrary to standard stability models, the present paper considers the impact of local position and $T_{\rm eff}$, in a single multi-filamentary, superconductor tape, at t $T_{\rm eff}$ intensity of disturbances on superconductor stability (local liux flow and Onfinic resistance losses). **Cable superconductor (Source: Nexans). One tape contains 91 identical filamentary include of fine superconductor is stable if it does not quench, while** erains and determined in a sudden phase of the sudden θ m verv small timescales **Dimensions: x ≤ 280 µm (filament) and about 3.8 mm (total material. The tapes are switched in parallel to yield the total,** an use such the second a final and helew) and move on very sman unrestates (ms and below) and may
conductor Contrary to standard stability models the conductor. Comitally to standard stablity models, the present paper considers the impact of local position and
intensity of disturbances on superconductor stability (local flux flow and Ohmic resistance losses). Λ curves conductor (Source: Λ A superconductor is stable if it does not quench, which means if it under a disturbance do ded in a material material. The tapes are switched in parallel to yield the tapes are switched in \mathcal{L} α to α multi-filamentary superconductor cable conductor α on very small timescales (ms and below) and may lead to local damage or even to destruction of the superment) and y conductor. Contratum conductors α ∇ undesirable, sudden phase transition from its superconducting to normal conducting Ω $u_n = \frac{1}{2} \int_0^{\pi} \frac{1}{2}$ on a superconductor is stable in traces not querich, which means in it under a disturbance do conduction and state in priase transition models superconducting to nominal conducting state
The present present improposite (me and below) and may lead to local demogrape and seek on very oman ameseares (mo and below) and may read to rocal damage or even **if it does not quench, which means if it under a disturbanctle is to yield the total to it is the to it. gravition** from ite cunerconducting to normal conduction ty models, the present paper considers the impact of local position and **cal TIU** \mathcal{L} to 300 of the **ππασσοποι γασποιη windumoure in andor α αισιαισαποσ ασσοποι porrorm α mode**
e transition from its superconducting to normal conducting state. Quench proceeds **Dimensions: x ≤ 280 µm (filament) and about 3.8 mm (total tape width), and y ≤ 30 µm (filament) and y = 250 to 300 µm** ndard stability models, the present paper considers the II **108 ICCES ON SUPERCONDUCTOR STE Dimensions: x 280 ≤ µm (filament) and about 3.8 mm (total** total, multi-filamentary superconductor cable cross section. Dimensions: x ≤ It is and below) and may lead to local damage or even to destruction of the super-**1 stability models, the present paper** 2 m it dood not quonon, windi modio in it diidor a dis se transition from its superconducting to normal c

- $\begin{array}{c} 87.1079 \ 88.7893 \end{array}$ $\begin{array}{c} 90.4708 \ 92.1522 \end{array}$ Transient temperature distribution **fields**, Transieric competature distribution tape univer a strong uisturbance. L **at t = 6.5 ms results from a sudden increase of transport current to a fault (20 times increase of the fault ms). Losses initially arise from flux flow resistance (transport** contours. The Figure clearly shows
All the current density of the store is a second of the store of the store is a second $\frac{104.719}{109.314}$ $\frac{113.909}{118.505}$ (iie illaments, is NOT homogeneou $\begin{bmatrix} 87.1079 \\ 68.7893 \end{bmatrix}$ a single multi-filamentary, superconductor $\begin{bmatrix} 0 \\ 0 \end{bmatrix}$ Transient temperature distribut and 8.6 marrorette starting at the disturbance starting at the distribution of the starting starting at the starting of the starting starting method of the starting strength of the starting method of the starting method of $\frac{1}{\sqrt{2}}$ sults from a subset of the fault of the fault of the fault (20 times increase increase increase increase increase in $\frac{1}{\sqrt{2}}$ $\frac{1}{\sqrt{2}}$ set over $\frac{1}{\sqrt{2}}$ and $\frac{1}{\sqrt{2}}$ arise from flux flow the losses arise from flux flow K followed by Ohmic resistances) situalization of the diagram contours. The Figure clearly shows ons apply 19 apply 113,909 and the filaments is NOT homogened diagram and the settlem by Ohmic Resistance losses. Captain and the settlement of the settlement of the settleme
In a statute of the settlement of the *NTC* **+ 2.2 ARAD, with radiative conductivity in the conductivity of the conducti leads the properties of the properties of the from application properties of** \mathbf{r} **in the from application of** \mathbf{r} **in the properties of** \mathbf{r} **in the following state** \mathbf{r} **in the following state** \mathbf{r} **in th rigorous scattering theory. The Meissner effect is significant in each** K **, followed by Ohmic resista** $\overline{53}$ as. 7893 92.1522 Degree and Degree losses. Calculation by Ohmic Reserves. Calculation and $\overline{5}$ $\frac{1}{\sqrt{2}}$ scattering the Meissner effect is simulated in $\frac{1}{\sqrt{2}}$ Figure the losses arise from contours. The Figure clearly shows that superconductor **D) Transient temperature distribution (detail) within filaments, Ag**where maximum conductor temperature is expected. ter a strong disturbance. Loc ed by Oninic resistances). Thir
———————————————————— σ maximum cond σ where may increase the matrice of the matrice is expected. contours. The Figure clearly shows that superconductor
	- temperature field is transient density, can be a contracted and transport current distributions thus thus thus temperature field is transient and the numerical positions are convergenced by an analyze of the numerical positions and the numerical positions and the numerical positions and the numerical positions and the numerical pos red an local temperature of **Transpect current transjontly escillates through the conductor** ond on local tomporature, the manaport carront trancionity coolidies through the conde
Ohmic resistive states will be temperature field is transient end on local temperature. • Transport current transiently oscillates through the cor Ohmic resistive states will temperature field is transient

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;, would disturb an otherwise homo- cannot be uniform ty), and corresponding initial flux flow losses, would disturb an otherwise homonsi- • Critical current density, d • **Complicated mesh (thin film dimensions)** • It is not realistic, even in thin films, to assume uniform conductor temperature: **Figure 1. Convergence of the Finite Element cannot be uniform scheme of the Finite Element cannot be uniform scheme.** Even and transport current density, entited may nette mera and transport current distribution.
Connect be uniform ty), and corresponding initial flux flow losses, would disturb an otherwise homo**current density exceeding critical current density), later (bottom** current density, critical magnetic field and transport current distributions th *λ* **and** α **are** α **and** α **a** α urrant dansity, critical magnatic fiald and transport currant distributions. wave let the dependixy, of the diffusion dependent conservation properties of risk and risk and risk to risk \mathcal{G} scattering theory. The Meissner effect is simulated in each of the upset is • $\mathsf{Non\text{-}cc}$ nsi- • Critical current density, critical magnetic field and transport current distributions thus time of occurrence of a quench cannot be homogeneous, but flux flow resistive and Ohmic resistive states will cannot be uniform sport carront distinguished and onlocation of a guerrent calculation. $\texttt{Jre:}\quad$ nsi- \bullet Critical current density, d

• Transport current transiently oscillates through the conductor cross section, since

 \sim Transport current transiently oscillates through the conductor cross section, since \sim

 \cdot Non-convergence of the numerical scheme could help to identify local positions and

Filament Matrix material 108 K, at 208 K, at 208 K, and 208 K (total tape thickness). Critical temperature of BSCCO 2223 is 108 K, at 208 K, and 20 108 K, at zero magnetic field. At zero magnetic field. At zero magnetic field. At zero magnetic field. At zero
108 K, at zero magnetic field. At zero magnetic field. At zero magnetic field. At zero magnetic field. At zero **Filament Matrix material**

C) Numerical (Finite Element) simulation of transient temperature

ecodiot, once by shoe, not permanently, in the conductor cross section
• Critical current density critical magnetic field and transport current distributions thus time of occurrence of a quench cannot be uniformly assumed to the uniformly state of the uniformly state of the uniformly state of the uniform
Cannot be uniformly state of the uniformly state of the uniformly state of the uniformly state of the uniforml time or occurrence or a quench transient of conductor cross section, since α is seen to uniform the conductor cross section, since α is a conductor cross section, since α is a conductor cross section, since α i $\frac{1}{2}$ indition of a current density correlation of a current distribution of and transport current distributions of a current distribution of a current distribution of a current distribution of a current distribution time of occurrence of a quench
 $\frac{1}{2}$ flux flow resistance (transport current density exceeding critical current den ecodiat, and by and, not permanding, in the conductor cross section
• **Confluence of the numerical metal**e field and transport current distributions thus time of occurrence of a quench •
• Critical current density critical

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C) Numerical (Finite Element) simulation of transient temperature fields,

cannot be uniform and the uniform of the uniform α

manufacturing process.

coexist, side by side, not pe.
 b assume uniform conductor temperature: From the servery serve of any server to the herecall control.
Flow losses, would disturb an otherwise homo-
 results annonnelles from perature.
Critical current density processed and the manufacturing process. **Problem:** e lt is not realistic, even in thin films, to assume uniform conductor temperature:
• It is not realistic, even in thin films, to assume uniform conductor temperature: **Example and Suite with very large and such very large such ve** even an extended fault transport current density exceeding critical current densi-
ty), and corresponding initial flux flow losses, would disturb an otherwise homo- cannot be uniform de de de la contrature distribution de la contrata de la contrata de la contrata de la contrata de la contrata
Contrata de la contrata de la contr y), and corresponding initial flux flo \mathcal{S} strongly different materials transport properties (electrical, thermal), thermal \mathcal{S} in extended fault transport current density exceeding critical current densi-
d corresponding initial flux flow losses, would disturb an otherwise homo- cannot be uniform
set are anternal distribution • It is not realistic, even in thin films, to assume uniform conductor temperature:
Even an extended fault transport current density exceeding critical current densi- • Critica ty), and corresponding initial flux flow losses, would disturb an otherwise homoty), and corresponding initial flux flow losses, would disturb an otherwise homo- cannot be uniform
genous temperature distribution even an extended ratit transport current density exceed
tv), and corresponding initial flux flow losses, would dis y), and corresponding initial flux flo \mathcal{S} strongly different materials transport properties (electrical, thermal), thermal \mathcal{S}

B) Superconductor thin, plate-like grains in the filaments. Orientation of the