Supplementary Material for:

Heat source model development for thermal analysis of laser powder bed fusion using Bayesian optimization and machine learning

- Journal name: Integrating Materials and Manufacturing Innovation

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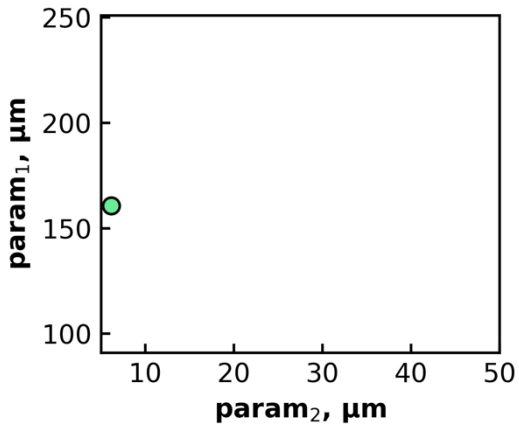
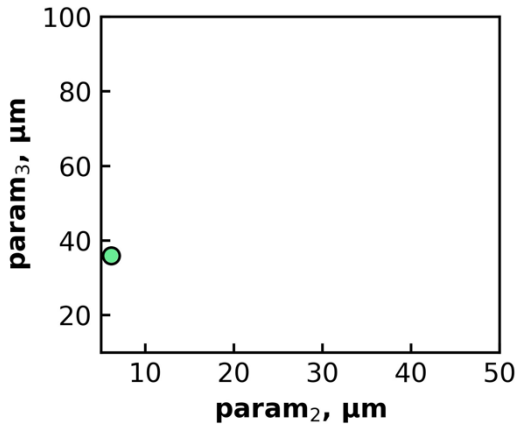
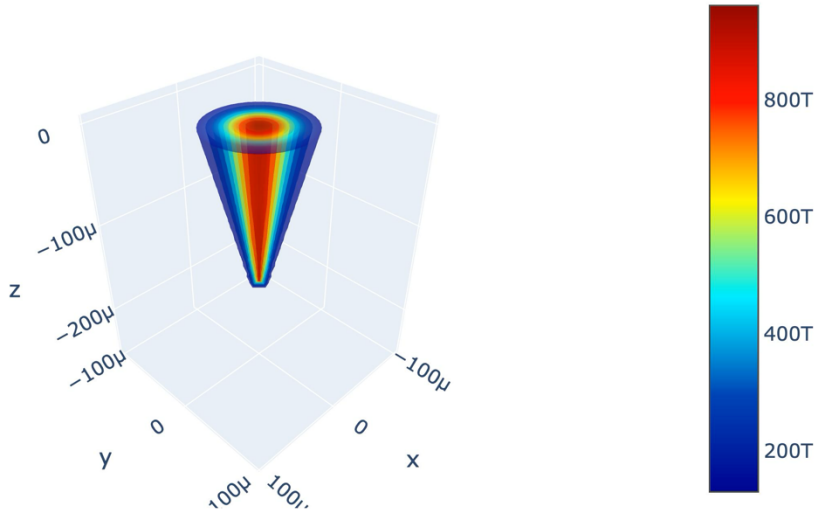


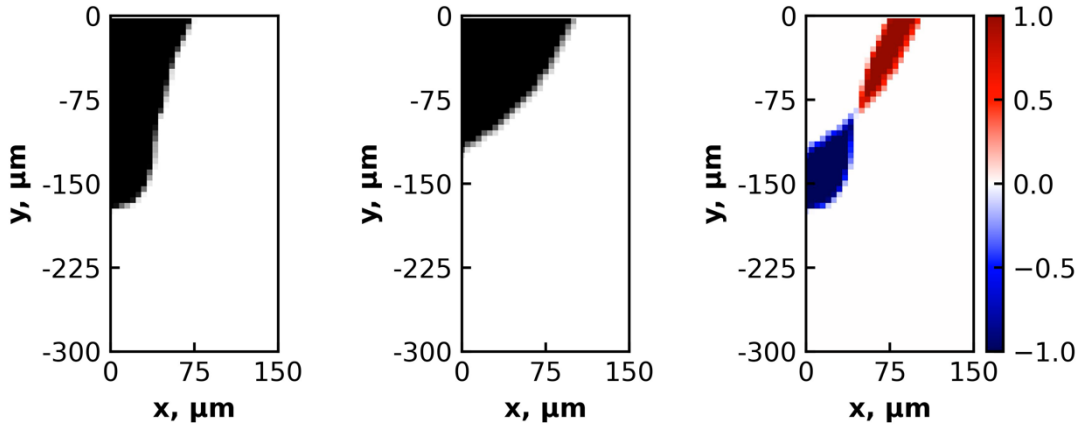
S1 Movie of h (param$_1$) against r_i (param$_2$) through the iterative calibration procedure for the conical heat source model



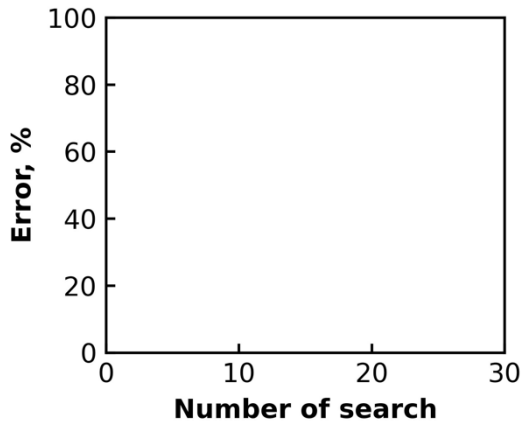
S2 Movie of r_e (param$_3$) against r_i (param$_2$) through the iterative calibration procedure for the conical heat source model



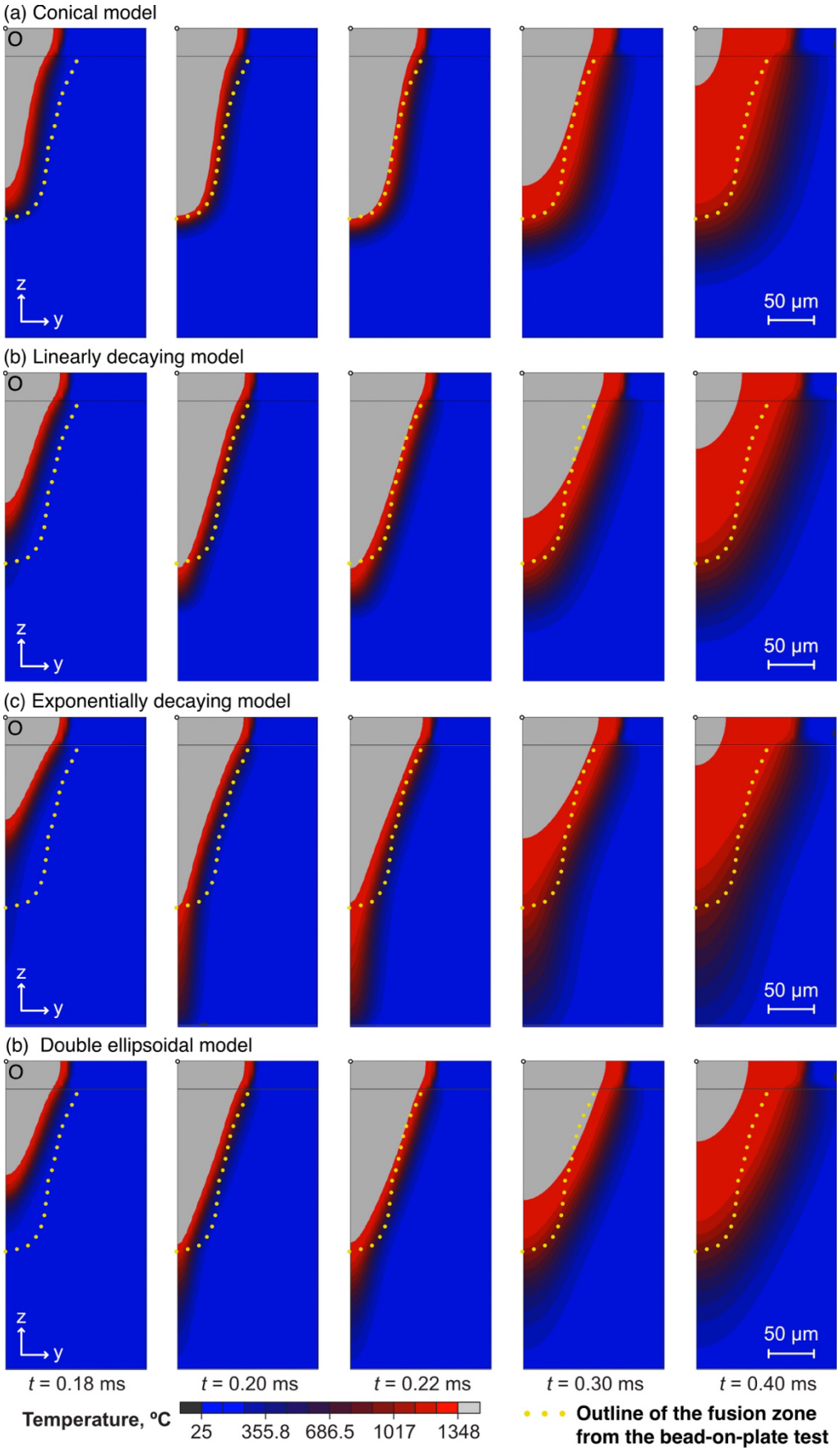
S3 Movie of volumetric heat flux of the conical heat source model through the iterative calibration procedure



S4 Movie of FZ_{obs} (left), FZ_{sim} (middle), and their difference (right) through the iterative calibration procedure



S5 Movie of the simulation error against the number of search through the iterative calibration procedure


(a) Conical model
O
z
y
50 μm
(b) Linearly decaying model
O
z
y
50 μm
(c) Exponentially decaying model
O
z
y
50 μm
(b) Double ellipsoidal model
O
z
y
50 μm
t = 0.18 ms
t = 0.20 ms
t = 0.22 ms
t = 0.30 ms
t = 0.40 ms
Temperature, °C
25
355.8
686.5
1017
1348
Outline of the fusion zone from the bead-on-plate test

S6 Temperature distributions at $P = 400$ W and $v = 1000$ mm/s simulated by the thermal analysis with (a) the conical, (b) linearly decaying, (c) exponentially decaying, and (b) double ellipsoidal heat source models with the calibrated shape parameters. The center of the heat source model is on the plane at $t = 0.20$ ms. The yellow dotted lines represent the outline of the fusion zone from the bead-on-plate test.