

APPENDIX
APPENDIX I
GENERAL PERFORMANCE OF THE OTHER FOUR FACES

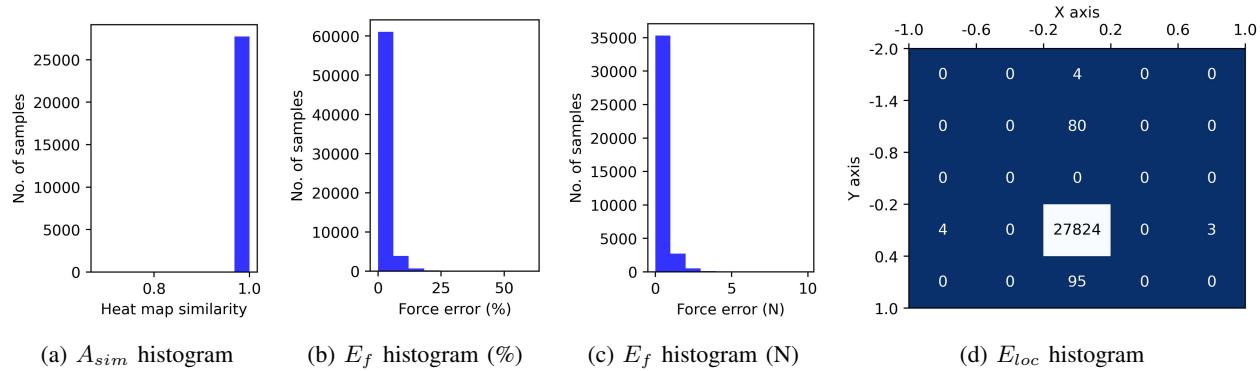


Fig. 1: **Face2** histograms of A_{sim} , E_f and E_{loc} .

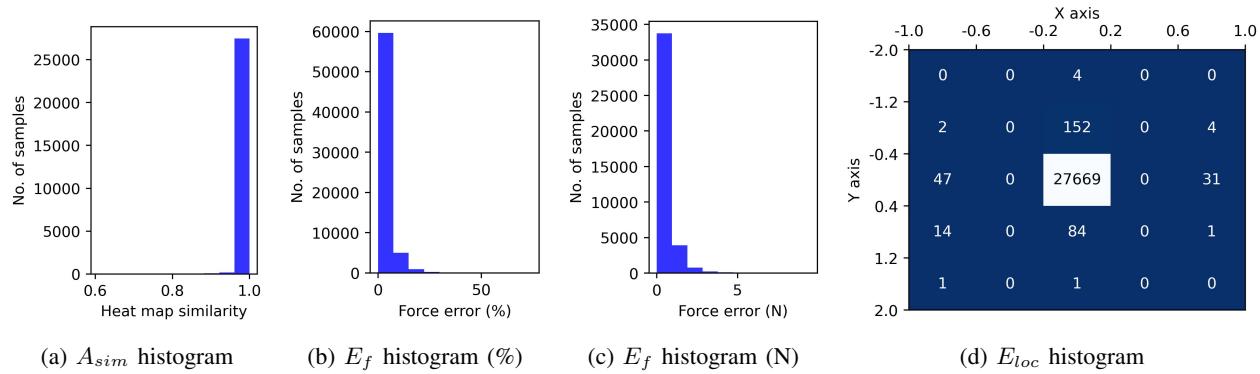


Fig. 2: **Face3** histograms of A_{sim} , E_f and E_{loc} .

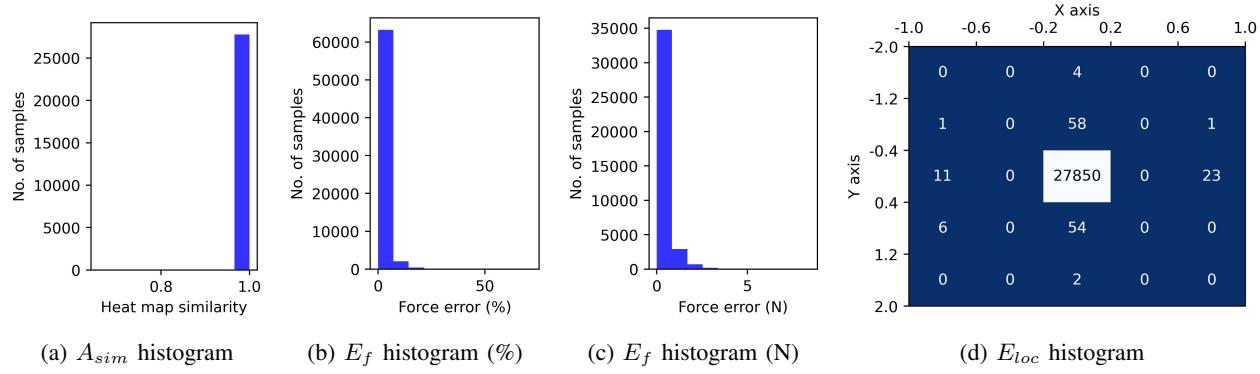


Fig. 3: **Face4** histograms of A_{sim} , E_f and E_{loc} .

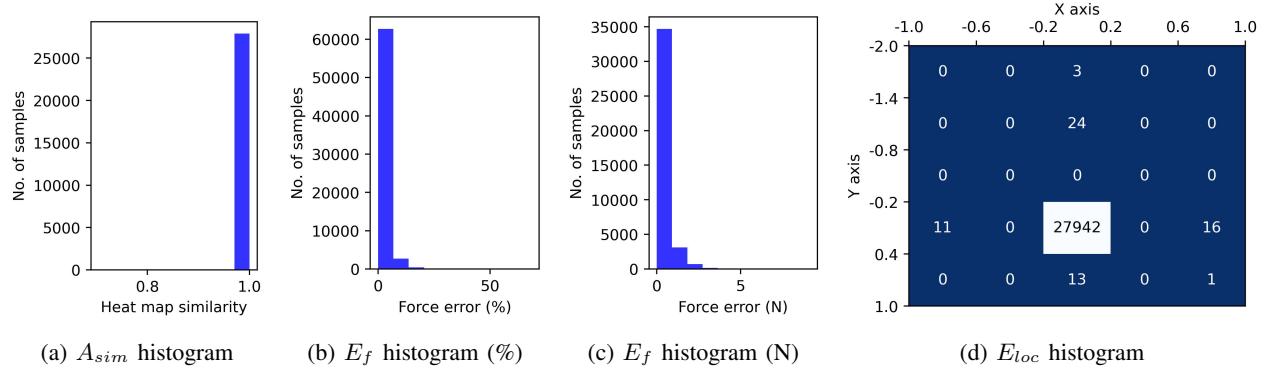


Fig. 4: Face5 histograms of A_{sim} , E_f and E_{loc} .

APPENDIX II LOCATION-WISE PERFORMANCE OF THE FIVE FACES

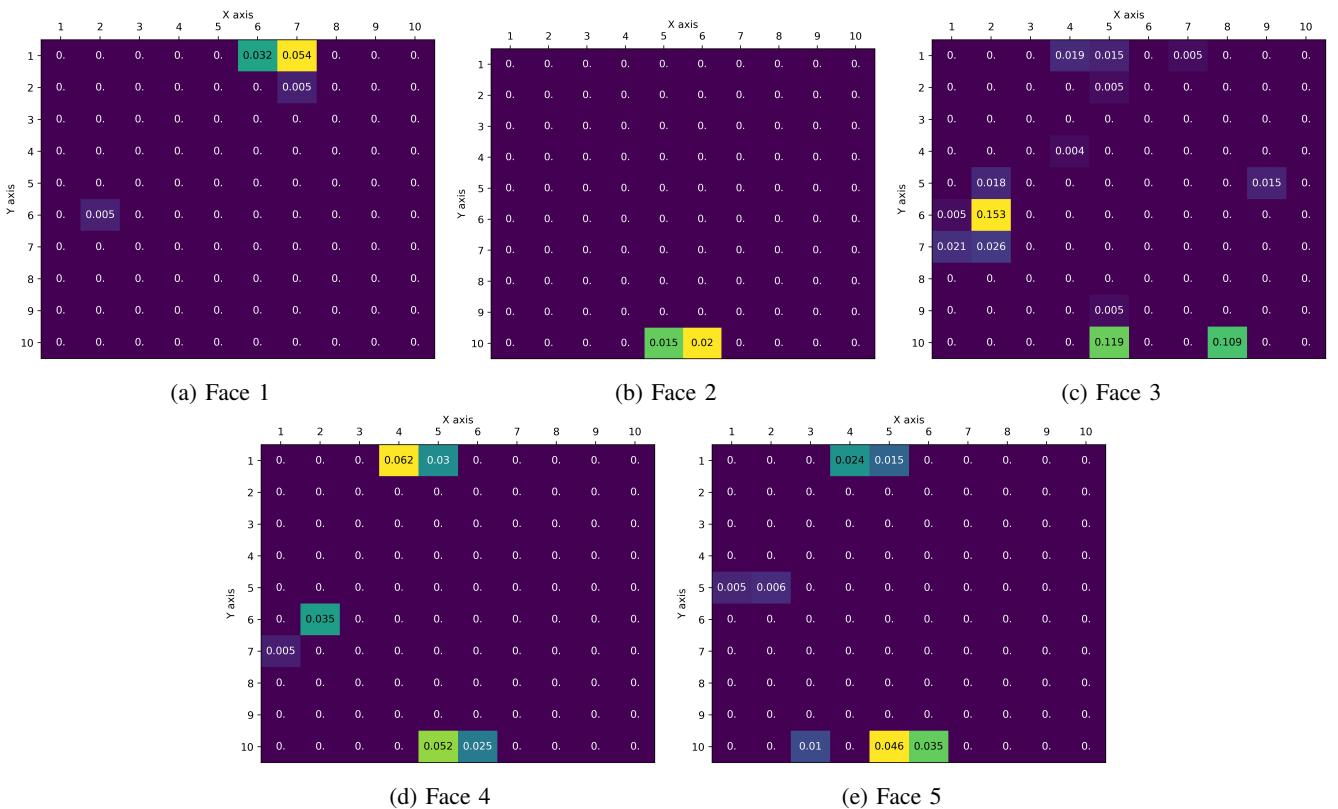


Fig. 5: Location-wise average location errors in X-axis for single-contact cases, the numbers are in the unit of pixel.

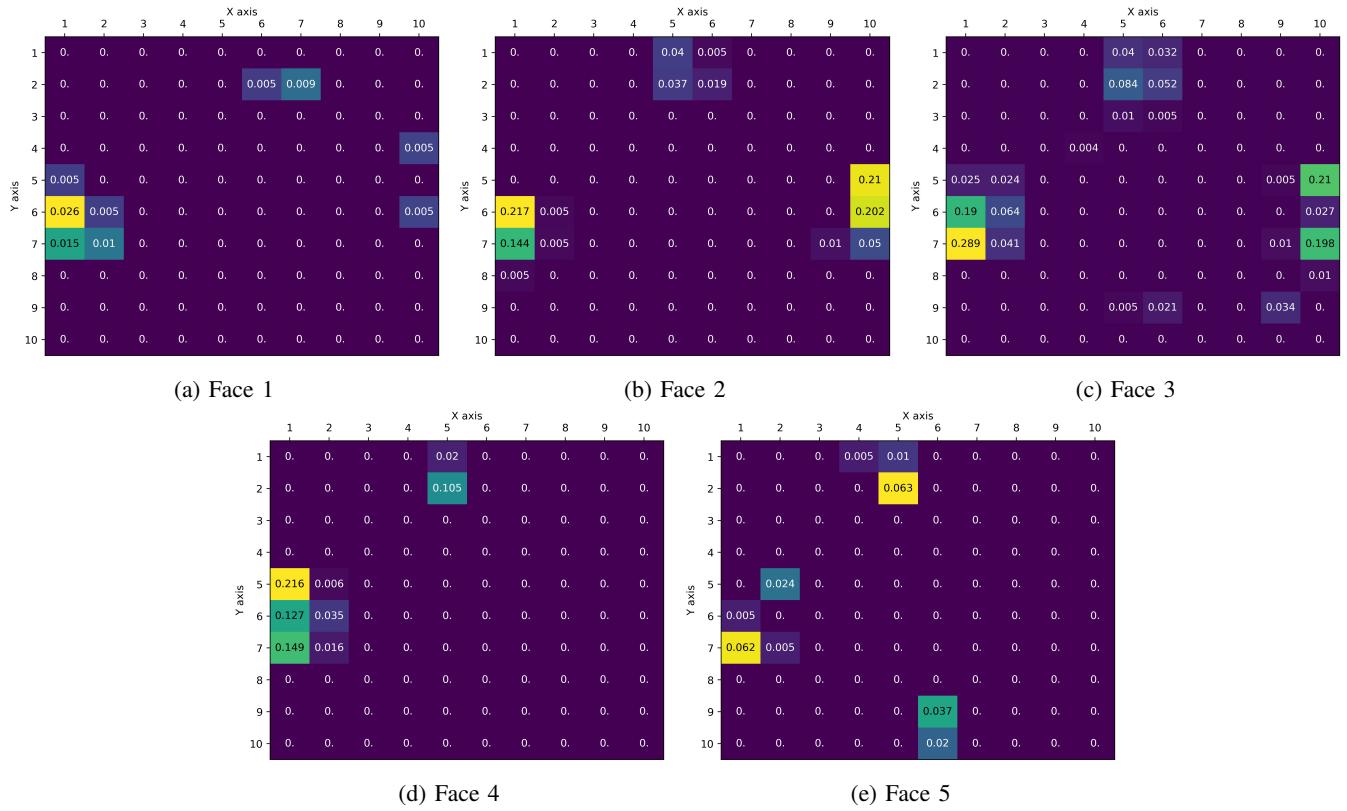


Fig. 6: Location-wise average location errors in Y-axis for single-contact cases, the numbers are in the unit of pixel.

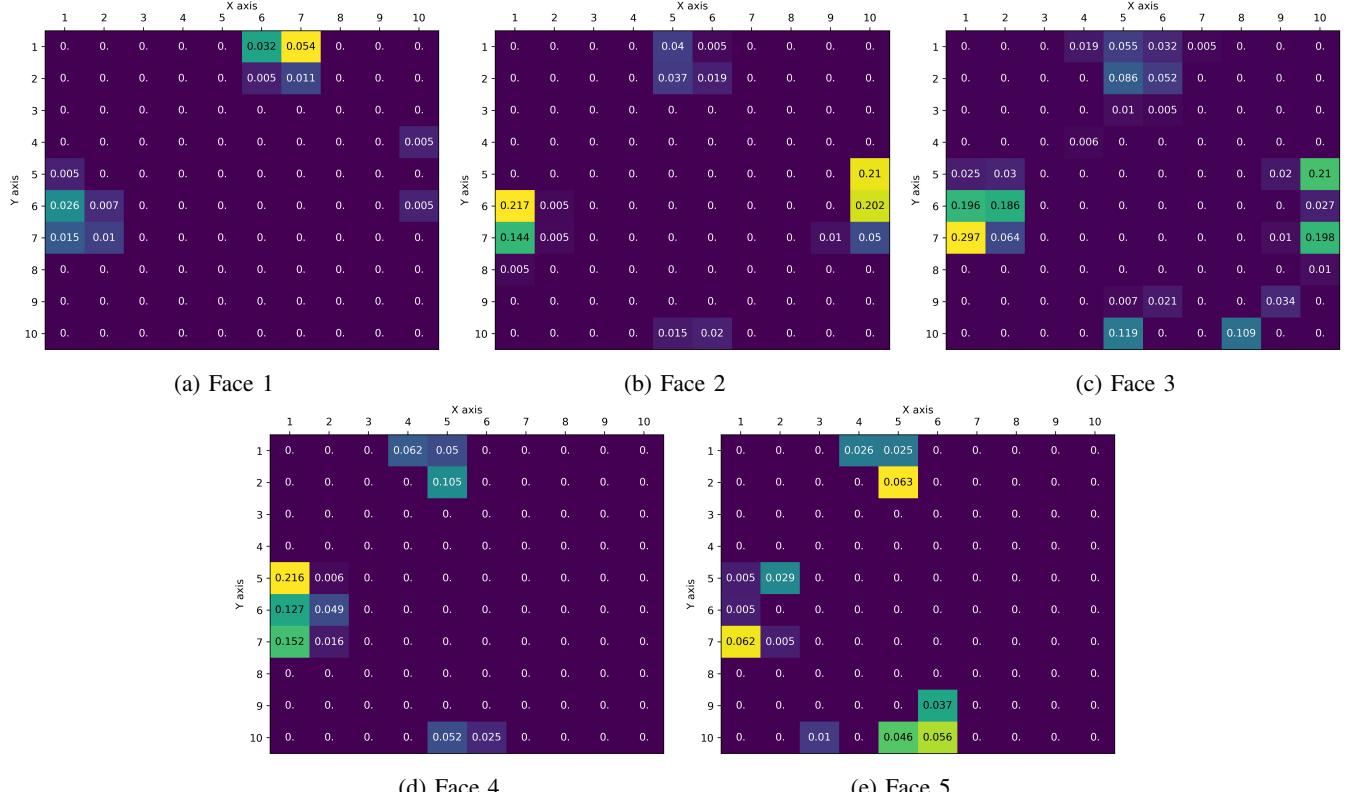
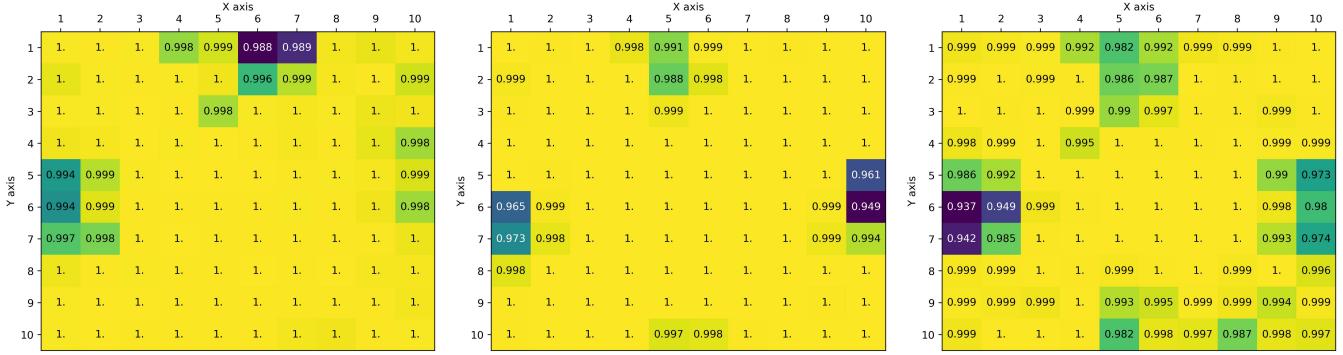


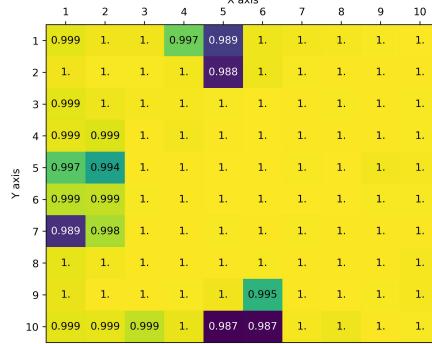
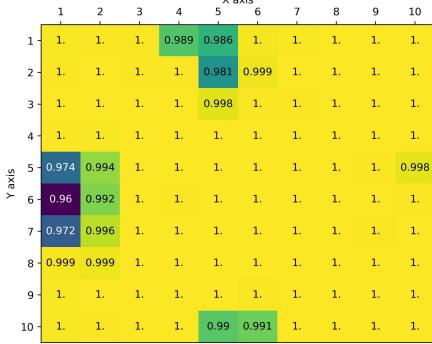
Fig. 7: Location-wise average location errors in Euclidean distance for single-contact cases, the numbers are in the unit of pixel.



(a) Face 1

(b) Face 2

(c) Face 3



(d) Face 4

(e) Face 5

Fig. 8: Location-wise average heatmap similarities for single-contact cases.



(a) Face 1

(b) Face 2

(c) Face 3



(d) Face 4

(e) Face 5

Fig. 9: Location-wise average force errors for single-contact cases, shown with both percentage (**bold**) and real force errors (in Newtons in brackets).

APPENDIX III
LOCATION-WISE FORCE SENSITIVITY OF THE FIVE FACES

X axis										
1	2	3	4	5	6	7	8	9	10	
1. 6.019 (4.37)	10.473 (7.03)	7.693 (5.83)	11.768 (9.62)	7.213 (6.04)	3.827 (3.54)	3.307 (3.09)	6.692 (5.94)	9.459 (8.54)	9.156 (8.04)	
2. 8.664 (3.065)	15.581 (12.915)	3.843 (3.018)	12.505 (10.478)	5.761 (5.406)	4.355 (2.941)	8.203 (3.767)	6.339 (3.091)	7.515 (3.362)		
3. 8.139 (4.37)	14.527 (15.168)	37.775 (37.988)	43.987 (40.704)	17.666 (7.03)	9.758 (3.918)	8.834 (3.715)	12.509 (5.357)	17.246 (7.316)	14.504 (6.334)	
4. 6.584 (3.493)	10.92 (5.015)	34.825 (14.773)	28.63 (11.292)	21.827 (8.244)	24.434 (9.228)	21.573 (8.509)	16.507 (6.877)	19.29 (6.626)	15.555 (7.071)	
5. 2.904 (1.107)	5.75 (1.682)	13.969 (3.118)	20.704 (10.061)	35.387 (15.933)	58.732 (16.619)	33.822 (24.291)	28.682 (9.569)	12.781 (5.291)	9.998 (4.994)	
6. 2.037 (1.333)	4.056 (3.147)	9.231 (4.144)	5.767 (2.875)	44.803 (21.232)	52.598 (20.713)	66.14 (26.862)	24.475 (8.674)	9.324 (5.728)	6.654 (3.954)	
7. 2.483 (4.203)	6.711 (5.797)	6.676 (10.642)	26.142 (12.896)	46.019 (12.867)	78.537 (13.884)	59.082 (14.839)	22.38 (6.988)	9.367 (5.548)	6.844 (4.994)	
8. 8.017 (5.485)	12.753 (8.359)	25.785 (20.879)	32.916 (16.839)	35.224 (16.982)	38.324 (16.982)	39.61 (16.982)	17.873 (7.071)	13.691 (5.548)	11.66 (4.994)	
9. 10.71 (5.485)	19.967 (8.359)	53.405 (20.879)	41.444 (16.839)	22.734 (8.668)	13.055 (4.973)	13.08 (4.982)	13.721 (6.701)	17.442 (5.485)	14.029 (5.485)	
10. 12.381 (5.485)	23.085 (5.485)	37.944 (14.232)	36.165 (15.997)	15.795 (5.342)	6.988 (2.773)	7.328 (3.599)	8.533 (3.517)	9.233 (2.715)	7.215 (2.512)	

(a) Face 1

(b) Face 2

(c) Face 3

(d) Face 4

(e) Face 5

X axis										
1	2	3	4	5	6	7	8	9	10	
1. 1.078 (1.099)	1.124 (1.162)	0.789 (0.739)	0.514 (0.482)	0.311 (0.288)	0.296 (0.269)	1.082 (1.054)	5.179 (5.154)	4.803 (4.779)	3.557 (3.539)	
2. 0.762 (2.244)	1.338 (1.305)	1.236 (1.277)	1.106 (1.465)	0.727 (1.480)	2.865 (5.819)	25.825 (46.99)	10.694 (17.968)	5.505 (5.192)		
3. 1.086 (2.905)	2.408 (5.689)	2.172 (4.28)	1.895 (3.599)	0.743 (1.372)	1.326 (2.301)	3.559 (6.057)	19.344 (31.104)	23.409 (36.517)	3.113 (5.745)	
4. 1.59 (4.126)	2.609 (5.604)	2.498 (4.675)	2.778 (4.759)	2.692 (4.091)	3.951 (4.991)	3.275 (4.991)	6.607 (4.991)	6.647 (4.991)	1.548 (2.779)	
5. 0.716 (1.162)	1.089 (1.162)	2.312 (1.339)	5.484 (4.818)	9.05 (8.009)	13.35 (13.359)	5.181 (5.181)	2.113 (2.113)	1.296 (1.296)	0.55 (0.55)	
6. 0.612 (1.069)	0.546 (1.162)	1.859 (1.339)	0.717 (1.072)	29.694 (41.625)	35.57 (44.893)	8.737 (8.737)	2.849 (3.518)	0.705 (1.124)	0.505 (0.918)	
7. 0.612 (1.064)	1.159 (2.511)	1.919 (3.565)	5.714 (2.993)	19.807 (14.485)	9.726 (9.719)	5.282 (3.509)	2.289 (2.172)	1.15 (1.377)	0.845 (0.845)	
8. 1.727 (4.713)	3.801 (6.663)	3.188 (6.235)	3.411 (6.248)	9.814 (6.348)	3.826 (5.546)	3.555 (12.23)	7.653 (11.304)	6.684 (8.722)	4.527 (4.527)	
9. 1.69 (5.531)	3.91 (6.904)	3.267 (4.809)	2.308 (3.156)	1.614 (2.993)	1.385 (2.993)	4.761 (3.839)	21.763 (38.549)	22.705 (59.071)	6.422 (12.847)	
10. 0.912 (5.927)	1.666 (4.157)	1.775 (4.268)	2.194 (5.376)	0.695 (1.364)	0.604 (1.364)	6.648 (10.241)	18.205 (37.567)	10.643 (20.507)	6.656 (7.212)	

Fig. 10: Location-wise force sensitivity for single-contact cases, with **bold** numbers in the normalized scale ($\times 10^{-15}$) and numbers in brackets for the real scale ($\times 10^{15}$).