

# Modeling of Falling Ball Impact Test Response on Solid, Veneer, and Traditional Engineered Wood Floorings of Several Hardwoods

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## SUPPLEMENTARY MATERIALS

**Table S1.** Descriptive statistics for the solid wood flooring.

Ball diameter (mm)	Height (m)	Thickness (mm)	Solid Wood Flooring (SW)							
			<i>Eucalyptus globulus</i>		<i>Eucalyptus grandis</i>		<i>Hymenaea courbaril</i>		<i>Quercus robur</i>	
			FD	ID	FD	ID	FD	ID	FD	ID
			$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )
50	0.6	-	1.174 (0.097)	0.283 (0.041)	1.465 (0.123)	0.342 (0.089)	0.906 (0.048)	0.110 (0.021)	1.170 (0.071)	0.191 (0.043)
	0.75	-	1.278 (0.070)	0.324 (0.060)	1.569 (0.082)	0.441 (0.094)	0.965 (0.051)	0.120 (0.014)	1.286 (0.102)	0.237 (0.054)
	0.90	-	1.376 (0.070)	0.346 (0.049)	1.664 (0.132)	0.481 (0.111)	0.981 (0.039)	0.125 (0.024)	1.347 (0.041)	0.282 (0.032)
	1.05	-	1.438 (0.039)	0.383 (0.054)	1.746 (0.142)	0.558 (0.124)	1.045 (0.049)	0.148 (0.025)	1.361 (0.066)	0.310 (0.024)
	1.20	-	1.446 (0.061)	0.419 (0.058)	1.823 (0.120)	0.674 (0.105)	1.079 (0.063)	0.187 (0.037)	1.430 (0.050)	0.328 (0.040)
40	0.6	-	0.966 (0.054)	0.238 (0.048)	1.118 (0.072)	0.302 (0.077)	0.725 (0.047)	0.097 (0.012)	0.987 (0.089)	0.163 (0.026)
	0.75	-	0.981 (0.081)	0.278 (0.040)	1.150 (0.098)	0.312 (0.075)	0.770 (0.031)	0.114 (0.013)	1.070 (0.090)	0.179 (0.021)
	0.90	-	1.073 (0.075)	0.281 (0.044)	1.225 (0.121)	0.328 (0.072)	0.805 (0.038)	0.121 (0.019)	1.080 (0.093)	0.204 (0.032)
	1.05	-	1.113 (0.063)	0.288 (0.037)	1.255 (0.093)	0.368 (0.072)	0.801 (0.070)	0.126 (0.022)	1.077 (0.076)	0.222 (0.032)
	1.20	-	1.095 (0.106)	0.333 (0.055)	1.364 (0.059)	0.392 (0.082)	0.866 (0.042)	0.145 (0.029)	1.145 (0.092)	0.224 (0.041)
30	0.6	-	0.698 (0.025)	0.167 (0.044)	0.827 (0.047)	0.257 (0.042)	0.607 (0.027)	0.059 (0.012)	0.743 (0.047)	0.106 (0.012)
	0.75	-	0.728 (0.048)	0.196 (0.056)	0.892 (0.055)	0.265 (0.059)	0.657 (0.042)	0.084 (0.016)	0.813 (0.078)	0.136 (0.026)
	0.90	-	0.762 (0.044)	0.214 (0.044)	0.988 (0.066)	0.275 (0.063)	0.671 (0.026)	0.083 (0.014)	0.826 (0.060)	0.138 (0.022)
	1.05	-	0.823 (0.032)	0.222 (0.058)	0.975 (0.070)	0.288 (0.073)	0.719 (0.032)	0.099 (0.011)	0.845 (0.078)	0.160 (0.014)
	1.20	-	0.859 (0.059)	0.230 (0.036)	1.014 (0.093)	0.288 (0.086)	0.769 (0.024)	0.108 (0.013)	0.865 (0.074)	0.177 (0.015)

FD: footprint diameter (mm); ID: indentation depth (mm);  $\bar{x}$ : mean;  $\sigma$ : standard deviation.

Table S2. Descriptive statistics for the engineered wood floorings.

Ball diameter (mm)	Height (m)	Thickness (mm)	Engineered Wood Flooring (EWF)							
			<i>Eucalyptus globulus</i>		<i>Eucalyptus grandis</i>		<i>Hymenaea courbaril</i>		<i>Quercus robur</i>	
			FD	ID	FD	ID	FD	ID	FD	ID
			$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )
50	0.6	0.60	0.998 (0.029)	0.076 (0.006)	1.089 (0.024)	0.095 (0.009)	0.755 (0.020)	0.038 (0.005)	0.947 (0.028)	0.064 (0.005)
		3.00	1.063 (0.071)	0.261 (0.050)	1.265 (0.076)	0.282 (0.062)	0.784 (0.060)	0.082 (0.018)	1.102 (0.122)	0.186 (0.060)
	0.75	0.60	1.019 (0.027)	0.083 (0.007)	1.108 (0.031)	0.096 (0.005)	0.808 (0.017)	0.043 (0.004)	1.010 (0.016)	0.071 (0.009)
		3.00	1.195 (0.093)	0.278 (0.056)	1.291 (0.061)	0.301 (0.056)	0.840 (0.073)	0.086 (0.021)	1.156 (0.121)	0.195 (0.073)
	0.90	0.60	1.094 (0.036)	0.082 (0.011)	1.162 (0.025)	0.100 (0.008)	0.842 (0.028)	0.049 (0.010)	1.046 (0.023)	0.076 (0.005)
		3.00	1.224 (0.073)	0.274 (0.065)	1.387 (0.088)	0.370 (0.077)	0.905 (0.050)	0.094 (0.014)	1.204 (0.098)	0.226 (0.064)
	1.05	0.60	1.127 (0.025)	0.088 (0.010)	1.210 (0.027)	0.105 (0.008)	0.941 (0.029)	0.050 (0.004)	1.076 (0.020)	0.080 (0.008)
		3.00	1.314 (0.050)	0.312 (0.089)	1.455 (0.110)	0.382 (0.088)	0.927 (0.079)	0.105 (0.028)	1.247 (0.114)	0.231 (0.069)
	1.20	0.60	1.198 (0.033)	0.092 (0.008)	1.271 (0.026)	0.112 (0.014)	0.955 (0.037)	0.066 (0.008)	1.098 (0.069)	0.087 (0.006)
		3.00	1.298 (0.113)	0.331 (0.091)	1.516 (0.095)	0.444 (0.071)	1.018 (0.053)	0.139 (0.024)	1.278 (0.109)	0.244 (0.083)
40	0.6	0.60	0.759 (0.035)	0.061 (0.004)	0.859 (0.021)	0.080 (0.007)	0.621 (0.018)	0.036 (0.003)	0.710 (0.020)	0.064 (0.004)
		3.00	0.865 (0.079)	0.169 (0.053)	0.928 (0.063)	0.216 (0.036)	0.655 (0.029)	0.065 (0.014)	0.851 (0.093)	0.124 (0.048)
	0.75	0.60	0.817 (0.024)	0.068 (0.006)	0.918 (0.017)	0.091 (0.007)	0.644 (0.020)	0.039 (0.006)	0.766 (0.028)	0.062 (0.005)
		3.00	0.917 (0.087)	0.193 (0.047)	0.972 (0.079)	0.229 (0.069)	0.674 (0.025)	0.064 (0.009)	0.897 (0.070)	0.128 (0.037)
	0.90	0.60	0.844 (0.033)	0.069 (0.005)	0.912 (0.019)	0.094 (0.010)	0.656 (0.015)	0.042 (0.003)	0.811 (0.018)	0.064 (0.004)
		3.00	0.955 (0.095)	0.220 (0.070)	1.005 (0.075)	0.267 (0.075)	0.749 (0.026)	0.082 (0.013)	0.967 (0.100)	0.155 (0.044)
	1.05	0.60	0.887 (0.032)	0.075 (0.011)	0.934 (0.025)	0.098 (0.009)	0.667 (0.025)	0.044 (0.004)	0.841 (0.024)	0.064 (0.007)
		3.00	1.030 (0.072)	0.246 (0.057)	1.060 (0.044)	0.271 (0.054)	0.767 (0.049)	0.095 (0.019)	0.978 (0.102)	0.158 (0.055)
	1.20	0.60	0.922 (0.025)	0.083 (0.011)	0.986 (0.033)	0.098 (0.009)	0.701 (0.030)	0.043 (0.007)	0.857 (0.023)	0.068 (0.007)
		3.00	1.037 (0.115)	0.263 (0.088)	1.138 (0.049)	0.331 (0.056)	0.812 (0.049)	0.107 (0.020)	1.005 (0.107)	0.177 (0.061)

FD: footprint diameter (mm); ID: indentation depth (mm);  $\bar{x}$ : mean;  $\sigma$ : standard deviation.

**Table S2.** Descriptive statistics for the engineered wood floorings (continued).

Ball diameter (mm)	Height (m)	Thickness (mm)	Engineered Wood Flooring (EWF)							
			<i>Eucalyptus globulus</i>		<i>Eucalyptus grandis</i>		<i>Hymenaea courbaril</i>		<i>Quercus robur</i>	
			FD	ID	FD	ID	FD	ID	FD	ID
			$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )	$\bar{x}$ ( $\sigma$ )
30	0.6	0.60	0.553 (0.027)	0.056 (0.005)	0.629 (0.023)	0.067 (0.003)	0.506 (0.016)	0.031 (0.003)	0.571 (0.021)	0.051 (0.002)
		3.00	0.649 (0.048)	0.121 (0.037)	0.692 (0.057)	0.145 (0.040)	0.577 (0.048)	0.062 (0.015)	0.639 (0.080)	0.091 (0.035)
	0.75	0.60	0.575 (0.021)	0.056 (0.004)	0.661 (0.022)	0.075 (0.007)	0.512 (0.020)	0.038 (0.002)	0.590 (0.016)	0.055 (0.003)
		3.00	0.708 (0.056)	0.143 (0.030)	0.725 (0.041)	0.156 (0.030)	0.577 (0.023)	0.055 (0.009)	0.700 (0.076)	0.101 (0.032)
	0.90	0.60	0.599 (0.029)	0.064 (0.012)	0.684 (0.026)	0.075 (0.004)	0.529 (0.014)	0.037 (0.004)	0.615 (0.016)	0.055 (0.007)
		3.00	0.716 (0.060)	0.155 (0.036)	0.784 (0.057)	0.164 (0.034)	0.583 (0.047)	0.066 (0.017)	0.712 (0.069)	0.101 (0.025)
	1.05	0.60	0.614 (0.037)	0.066 (0.015)	0.713 (0.024)	0.088 (0.012)	0.571 (0.027)	0.039 (0.003)	0.628 (0.020)	0.059 (0.004)
		3.00	0.760 (0.066)	0.183 (0.054)	0.769 (0.096)	0.179 (0.052)	0.633 (0.027)	0.082 (0.016)	0.747 (0.048)	0.122 (0.031)
	1.20	0.60	0.620 (0.034)	0.061 (0.015)	0.735 (0.034)	0.085 (0.007)	0.572 (0.025)	0.040 (0.003)	0.634 (0.024)	0.062 (0.006)
		3.00	0.783 (0.073)	0.205 (0.061)	0.863 (0.108)	0.192 (0.046)	0.639 (0.042)	0.090 (0.012)	0.772 (0.109)	0.131 (0.050)

FD: footprint diameter (mm); ID: indentation depth (mm);  $\bar{x}$ : mean;  $\sigma$ : standard deviation.