

Table 1: Unique set of dimensionless products

	$F_c$	$\Phi_c$	$l_c$	$d_c$	$\rho_c$	$E_c$	$\sigma_{yc}$	$l_p$	$d_p$	$\rho_p$	$E_p$	$l_p$	$d_p$	$\rho_p$	$E_p$	$\Delta P$	$v$	$x_t$	$\Phi_c$	$\mu_{cs}$	$\mu_{ss}$	$\mu_a$
$\Pi_1$	1																0	-2	-1			
$\Pi_2$		1															-1	1	-1			
$\Pi_3$			1														0	-1	0			
$\Pi_4$				1													0	-1	0			
$\Pi_5$					1												2	0	-1			
$\Pi_6$						1											0	0	-1			
$\Pi_7$							1										0	0	-1			
$\Pi_8$								1									0	-1	0			
$\Pi_9$									1								0	-1	0			
$\Pi_{10}$										1							2	0	-1			
$\Pi_{11}$											1						0	0	-1			
$\Pi_{12}$												1					0	-1	0			
$\Pi_{13}$													1				0	-1	0			
$\Pi_{14}$														1			2	0	-1			
$\Pi_{15}$															1		0	0	-1			
$\Pi_{16}$																1	0	0	-1			
$\Pi_{17}$																				1		
$\Pi_{18}$																					1	
$\Pi_{19}$																						1