

Supplementary Material

C.C. Chen's Minimal Surface: From Parametric Form to Algebraic Equation

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A Algebraic Equation of Chen's Minimal Surface in Cartesian Coordinates

$$Q(x, y, z) = Q_{25}(x, y, z) + Q_{24}(x, y, z) + Q_{23}(x, y, z) + \cdots + Q_1(x, y, z)$$

with

$$Q_{25}(x, y, z) = \text{terms of degree 25}$$

$$Q_{24}(x, y, z) = \text{terms of degree 24}$$

$$Q_{23}(x, y, z) = \text{terms of degree 23}$$

$$\dots\dots\dots$$

$$Q_1(x, y, z) = \text{terms of degree 1}$$

where

$$Q_{25}(x, y, z) = 122680319758319203909632z^{25}$$

$$\begin{aligned} Q_{24}(x, y, z) = & 748781248524897484800000x^4z^{20} + 4492687491149384908800000x^2y^2z^{20} \\ & + 1597399996853114634240000x^2z^{22} - 748781248524897484800000y^4z^{20} \\ & - 1597399996853114634240000y^2z^{22} + 3407786659953311219712000z^{24} \end{aligned}$$

$$\begin{aligned}
Q_{23}(x, y, z) = & -26735658592960512000000000x^8z^{15} - 136191901892345856000000000x^6y^2z^{15} \\
& - 56548583872974028800000000x^6z^{17} - 101915416516755456000000000x^4y^4z^{15} \\
& - 130646728258250342400000000x^4y^2z^{17} - 29119270775968235520000000x^4z^{19} \\
& - 136191901892345856000000000x^2y^6z^{15} - 278843017028802969600000000x^2y^4z^{17} \\
& - 33279166601106554880000000x^2y^2z^{19} + 28620083276951637196800000x^2z^{21} \\
& - 26735658592960512000000000y^8z^{15} - 79947997889377075200000000y^6z^{17} \\
& - 103997395628457984000000000y^4z^{19} - 79204416510633600614400000y^2z^{21} \\
& + 41414073992488157184000000z^{23}
\end{aligned}$$

$$\begin{aligned}
Q_{22}(x, y, z) = & -106835074046640000000000000x^{12}z^{10} + 249374820359520000000000000x^{10}y^2z^{10} \\
& - 4022726408663040000000000000x^{10}z^{12} + 1530558880662960000000000000x^8y^4z^{10} \\
& + 15043568581509120000000000000x^8y^2z^{12} - 6728347129282560000000000000x^8z^{14} \\
& + 34912474850332800000000000000x^6y^6z^{10} + 7164737568092160000000000000x^6y^4z^{12} \\
& + 13583644204400640000000000000x^6y^2z^{14} - 7572310369197096960000000000x^6z^{16} \\
& + 15305588806629600000000000000x^4y^8z^{10} + 4998654117273600000000000000x^4y^6z^{12} \\
& + 31051956751368192000000000000x^4y^4z^{14} - 10925143072010403840000000000x^4y^2z^{16} \\
& - 3810204582337629388800000000x^4z^{18} + 2493748203595200000000000000x^2y^{10}z^{10} \\
& + 11020842172846080000000000000x^2y^8z^{12} - 1327896433439539200000000000x^2y^6z^{14} \\
& - 5403531347861962752000000000x^2y^4z^{16} - 1990365711501424066560000000x^2y^2z^{18} \\
& + 179721550849651419119616000x^2z^{20} - 106835074046640000000000000y^{12}z^{10}
\end{aligned}$$

$$\begin{aligned}
& - 466541050945536000000000000y^{10}z^{12} - 1426917391191244800000000000y^8z^{14} \\
& - 2611309605858312192000000000y^6z^{16} - 2638572812003966976000000000y^4z^{18} \\
& - 1534208282749207540924416000y^2z^{20} + 280982002080209015144448000z^{22} \\
Q_{21}(x, y, z) = & 12002846692895507812500000x^{16}z^5 + 73345054685097656250000000x^{14}y^2z^5 \\
& + 360664261478437500000000000x^{14}z^7 + 1959613694116699218750000000x^{12}y^4z^5 \\
& + 6956498086703437500000000000x^{12}y^2z^7 + 1622129587443000000000000000x^{12}z^9 \\
& - 1359982118905664062500000000x^{10}y^6z^5 + 9914453520218437500000000000x^{10}y^4z^7 \\
& + 23731054633206000000000000000x^{10}y^2z^9 + 2135337760811520000000000000x^{10}z^{11} \\
& + 382558815871435546875000000x^8y^8z^5 + 4373371976295937500000000000x^8y^6z^7 \\
& + 39483184295457000000000000000x^8y^4z^9 + 44516453142021120000000000000x^8y^2z^{11} \\
& + 1085157557839872000000000000x^8z^{13} - 1359982118905664062500000000x^6y^{10}z^5 \\
& - 8608362196677187500000000000x^6y^8z^7 + 33474679931556000000000000000x^6y^6z^9 \\
& + 99723810837242880000000000000x^6y^4z^{11} + 42794509366289203200000000000x^6y^2z^{13} \\
& - 2478710820003297361920000000x^6z^{15} + 1959613694116699218750000000x^4y^{12}z^5 \\
& + 64661690303128125000000000000x^4y^{10}z^7 + 28500588273285000000000000000x^4y^8z^9 \\
& + 79077914698106880000000000000x^4y^6z^{11} + 65817252314236108800000000000x^4y^4z^{13} \\
& + 2180385744560785981440000000x^4y^2z^{15} - 2410981091753217490944000000x^4z^{17} \\
& + 733450546850976562500000000x^2y^{14}z^5 + 4237532667340312500000000000x^2y^{12}z^7 \\
& + 13521749907078000000000000000x^2y^{10}z^9 + 29822327510376960000000000000x^2y^8z^{11} \\
& + 66291498521616384000000000000x^2y^6z^{13} - 4701755688395728748544000000x^2y^4z^{15}
\end{aligned}$$

$$\begin{aligned}
& - 25351296518786931228672000000x^2y^2z^{17} + 123137880908823841996800000x^2z^{19} \\
& + 12002846692895507812500000y^{16}z^5 + 9806581127812500000000000y^{14}z^7 \\
& - 2052166330233000000000000000y^{12}z^9 - 9178084365327360000000000000y^{10}z^{11} \\
& - 230233865136445440000000000000y^8z^{13} - 35903098830675593134080000000y^6z^{15} \\
& - 32626869096865767358464000000y^4z^{17} - 16796268087860348426649600000y^2z^{19} \\
& + 1075251655074707667733708800z^{21}
\end{aligned}$$

$$\begin{aligned}
Q_{20}(x, y, z) = & - 332525673007965087890625x^{20} + 9975770190238952636718750x^{18}y^2 \\
& - 18621437688446044921875000x^{18}z^2 - 121371870647907257080078125x^{16}y^4 \\
& + 93107188442230224609375000x^{16}y^2z^2 - 311421376961059570312500000x^{16}z^4 \\
& + 758158534458160400390625000x^{14}y^6 + 1060535213113403320312500000x^{14}y^4z^2 \\
& + 3496810419514160156250000000x^{14}y^2z^4 - 882440965374609375000000000x^{14}z^6 \\
& - 2517219344670295715332031250x^{12}y^8 - 7132897369802856445312500000x^{12}y^6z^2 \\
& + 2633248636171875000000000000x^{12}y^4z^4 + 3489160378217695312500000000x^{12}y^2z^6 \\
& + 3568772261984625000000000000x^{12}z^8 + 4082085161845779418945312500x^{10}y^{10} \\
& + 8947157441734313964843750000x^{10}y^8z^2 - 12843708056960449218750000000x^{10}y^6z^4 \\
& + 49221924463578515625000000000x^{10}y^4z^6 + 15770354567754375000000000000x^{10}y^2z^8 \\
& + 17236501064275046400000000000x^{10}z^{10} - 2517219344670295715332031250x^8y^{12} \\
& - 3094705596794128417968750000x^8y^{10}z^2 + 3726179239295654296875000000x^8y^8z^4 \\
& + 23391672267026953125000000000x^8y^6z^6 + 26444678492577037500000000000x^8y^4z^8
\end{aligned}$$

$$\begin{aligned}
& + 342915727668817996800000000000x^8y^2z^{10} + 22334190636670709760000000000x^8z^{12} \\
& + 758158534458160400390625000x^6y^{14} + 6636325698110961914062500000x^6y^{12}z^2 \\
& + 17436759557409667968750000000x^6y^{10}z^4 - 24295653408026953125000000000x^6y^8z^6 \\
& + 191454962216728500000000000000x^6y^6z^8 + 649148556599009280000000000000x^6y^4z^{10} \\
& + 362208375808276561920000000000x^6y^2z^{12} + 7263094572402868224000000000x^6z^{14} \\
& - 121371870647907257080078125x^4y^{16} - 2124617366738891601562500000x^4y^{14}z^2 \\
& + 9547418007729492187500000000x^4y^{12}z^4 + 4830472663402148437500000000x^4y^{10}z^6 \\
& + 188947872758127375000000000000x^4y^8z^8 + 540819864645799680000000000000x^4y^6z^{10} \\
& + 521226536808558551040000000000x^4y^4z^{12} + 71018703144912420864000000000x^4y^2z^{14} \\
& - 7646487195939804020736000000x^4z^{16} + 9975770190238952636718750x^2y^{18} \\
& + 172913349964141845703125000x^2y^{16}z^2 + 7618828219958496093750000000x^2y^{14}z^4 \\
& + 46518354973023046875000000000x^2y^{12}z^6 + 141841173362811750000000000000x^2y^{10}z^8 \\
& + 287474551021418803200000000000x^2y^8z^{10} + 157030725313905131520000000000x^2y^6z^{12} \\
& - 246803157322966499328000000000x^2y^4z^{14} - 179514683191690719657984000000x^2y^2z^{16} \\
& - 4813795047383966416896000000x^2z^{18} - 332525673007965087890625y^{20} \\
& + 886735128021240234375000y^{18}z^2 + 113265633685913085937500000y^{16}z^4 \\
& - 73196240825390625000000000y^{14}z^6 - 1771348355369437500000000000y^{12}z^8 \\
& - 80752091720058086400000000000y^{10}z^{10} - 193252295540893962240000000000y^8z^{12} \\
& - 284626271024035135488000000000y^6z^{14} - 247681421116712530477056000000y^4z^{16} \\
& - 120402900578061717287731200000y^2z^{18} + 1473354203622151374766080000z^{20}
\end{aligned}$$

$$\begin{aligned}
Q_{19}(x, y, z) = & -28818891660690307617187500x^{18}z + 6157882833480834960937500x^{16}y^2z \\
& - 1021972087657012939453125000x^{16}z^3 + 1991212993034362792968750000x^{14}y^4z \\
& + 6482913952554931640625000000x^{14}y^2z^3 - 8326711312602609375000000000x^{14}z^5 \\
& - 5660325900535583496093750000x^{12}y^6z + 16082222386294555664062500000x^{12}y^4z^3 \\
& + 8771214197446832812500000000x^{12}y^2z^5 - 18167608882833300000000000000x^{12}z^7 \\
& - 4756348700580596923828125000x^{10}y^8z - 81579894514288330078125000000x^{10}y^6z^3 \\
& + 95330876197875890625000000000x^{10}y^4z^5 + 485897548562089200000000000000x^{10}y^2z^7 \\
& + 133333219735416000000000000000x^{10}z^9 + 10382190457248687744140625000x^8y^{10}z \\
& + 11043872209778137207031250000x^8y^8z^3 - 22617351885309046875000000000x^8y^6z^5 \\
& + 816356918859191100000000000000x^8y^4z^7 + 1315787710452114240000000000000x^8y^2z^9 \\
& + 797296804973834227200000000000x^8z^{11} + 13254719641410827636718750000x^6y^{12}z \\
& + 77143749152640380859375000000x^6y^{10}z^3 - 354507914496472031250000000000x^6y^8z^5 \\
& + 6047270136327240000000000000000x^6y^6z^7 + 2444746525992624960000000000000x^6y^4z^9 \\
& + 16392843829972586649600000000000x^6y^2z^{11} + 723957867150772469760000000000x^6z^{13} \\
& - 5873142331260681152343750000x^4y^{14}z + 31967261153750610351562500000x^4y^{12}z^3 \\
& + 1759127007892678593750000000000x^4y^{10}z^5 + 664252100263700100000000000000x^4y^8z^7 \\
& + 21286621156233254400000000000000x^4y^6z^9 + 23609087835260412441600000000000x^4y^4z^{11} \\
& + 4578002572795960688640000000000x^4y^2z^{13} - 4884941447318865759436800000x^4z^{15} \\
& + 511104275178909301757812500x^2y^{16}z + 28771152468760986328125000000x^2y^{14}z^3 \\
& + 2067678756471379218750000000000x^2y^{12}z^5 + 688584392753785200000000000000x^2y^{10}z^7
\end{aligned}$$

$$\begin{aligned}
& + 146886824471125680000000000000000x^2y^8z^9 + 1050118161309222312960000000000x^2y^6z^{11} \\
& - 8859599722538989977600000000000x^2y^4z^{13} - 847191756238283086390886400000x^2y^2z^{15} \\
& - 31940772553568087860838400000x^2z^{17} + 10098927846908569335937500y^{18}z \\
& + 404055640001678466796875000y^{16}z^3 - 1441755530991140625000000000y^{14}z^5 \\
& - 890096885089443000000000000000y^{12}z^7 - 41773821424642080000000000000y^{10}z^9 \\
& - 1008073331962599732480000000000y^8z^{11} - 1477591156403401162752000000000y^6z^{13} \\
& - 1279547085284225661586636800000y^4z^{15} - 610268085959849702483558400000y^2z^{17} \\
& - 7205189123297188427857920000z^{19}
\end{aligned}$$

$$\begin{aligned}
Q_{18}(x, y, z) = & - 10478253429450988769531250x^{18} - 26725211497306823730468750x^{16}y^2 \\
& - 1216194668008758544921875000x^{16}z^2 - 632786995752250671386718750x^{16}z \\
& + 341725823644866943359375000x^{14}y^4 + 4027205015299072265625000000x^{14}y^2z^2 \\
& - 19362195107909472656250000000x^{14}z^4 + 1805276678770294189453125000x^{12}y^6 \\
& + 38067655525726684570312500000x^{12}y^4z^2 + 128282725036212011718750000000x^{12}y^2z^4 \\
& - 92208809114730618750000000000x^{12}z^6 - 11674585011645126342773437500x^{10}y^8 \\
& - 122118655910315185546875000000x^{10}y^6z^2 + 168268104859414746093750000000x^{10}y^4z^4 \\
& + 925328116039452637500000000000x^{10}y^2z^6 - 138982204985576760000000000000x^{10}z^8 \\
& + 11940605550051498413085937500x^8y^{10} - 38412862751764709472656250000x^8y^8z^2 \\
& - 308818393215156738281250000000x^8y^6z^4 + 1448614590835278318750000000000x^8y^4z^6 \\
& + 31088938551255183600000000000000x^8y^2z^8 + 30998693884052973312000000000x^8z^{10} \\
& + 8810147011842498779296875000x^6y^{12} + 120130257991137451171875000000x^6y^{10}z^2
\end{aligned}$$

$$\begin{aligned}
& -132255733111877636718750000000x^6y^8z^4 + 98225677602003892500000000000x^6y^6z^6 \\
& + 5828668019262507600000000000000x^6y^4z^8 + 4708394983621766421504000000000x^6y^2z^{10} \\
& + 202266299827834218086400000000x^6z^{12} - 4834517138952484130859375000x^4y^{14} \\
& + 70771474638146118164062500000x^4y^{12}z^2 + 363299226970050878906250000000x^4y^{10}z^4 \\
& + 1360604105630823318750000000000x^4y^8z^6 + 534051404583671160000000000000x^4y^6z^8 \\
& + 6977750814152589869568000000000x^4y^4z^{10} + 1677450319699611126988800000000x^4y^2z^{12} \\
& + 63046153190286466744320000000x^4z^{14} + 475019081774711608886718750x^2y^{16} \\
& + 51913961347093505859375000000x^2y^{14}z^2 + 486604733899272363281250000000x^2y^{12}z^4 \\
& + 191197241213116263750000000000x^2y^{10}z^6 + 464104055705425380000000000000x^2y^8z^8 \\
& + 4005512158587927727104000000000x^2y^6z^{10} - 2329896705572931128524800000000x^2y^4z^{12} \\
& - 2874755606872339977338880000000x^2y^2z^{14} - 96776841096153438596628480000x^2z^{16} \\
& + 11682461627998352050781250y^{18} + 626935748115509033203125000y^{16}z^2 \\
& - 7134690866406152343750000000y^{14}z^4 - 28527371364816961875000000000y^{12}z^6 \\
& - 1407575696495280840000000000000y^{10}z^8 - 3549839255567505785088000000000y^8z^{10} \\
& - 5366725363048485725798400000000y^6z^{12} - 4760349964937826293514240000000y^4z^{14} \\
& - 2289560709903208028433285120000y^2z^{16} - 48813787454641803362304000000z^{18}
\end{aligned}$$

$$\begin{aligned}
Q_{17}(x, y, z) = & -25453896060058593750000000x^{14}y^2z - 22476348856864160156250000000x^{14}z^3 \\
& + 29447201033285064697265625000x^{12}y^4z + 105792281211880371093750000000x^{12}y^2z^3 \\
& - 186043367986685375625000000000x^{12}z^5 - 55520405540803344726562500000x^{10}y^6z
\end{aligned}$$

$$\begin{aligned}
& + 276492753244475683593750000000x^{10}y^4z^3 + 119312181015060288375000000000x^{10}y^2z^5 \\
& - 53671035013301660400000000000x^{10}z^7 - 86647197367158096313476562500x^8y^8z \\
& - 611429476612641503906250000000x^8y^6z^3 + 175061555275786252312500000000x^8y^4z^5 \\
& + 503704438300345107600000000000x^8y^2z^7 - 48730238416988314560000000000x^8z^9 \\
& + 81871633306918212890625000000x^6y^{10}z - 378276277406810449218750000000x^6y^8z^3 \\
& + 60302692310097206250000000000x^6y^6z^5 + 929491618828744375200000000000x^6y^4z^7 \\
& + 935353799215739089920000000000x^6y^2z^9 + 170215211987762441011200000000x^6z^{11} \\
& + 78177784406062774658203125000x^4y^{12}z + 412270912751052832031250000000x^4y^{10}z^3 \\
& + 1594981769876000960625000000000x^4y^8z^5 + 891087968959003936800000000000x^4y^6z^7 \\
& + 14311770864976373126400000000000x^4y^4z^9 + 4145884581208660398489600000000x^4y^2z^{11} \\
& + 316334650360685779353600000000x^4z^{13} + 45395461282586791992187500000x^2y^{14}z \\
& + 657582501881148925781250000000x^2y^{12}z^3 + 331450899249908163375000000000x^2y^{10}z^5 \\
& + 981556094065844408400000000000x^2y^8z^7 + 1015837182083618864640000000000x^2y^6z^9 \\
& - 4664693436187821904281600000000x^2y^4z^{11} - 7295202746948710056591360000000x^2y^2z^{13} \\
& - 104706841040331051368448000000x^2z^{15} + 410726633110359191894531250y^{16}z \\
& - 16671127317091699218750000000y^{14}z^3 - 60581019483914168812500000000y^{12}z^5 \\
& - 323769437515420743600000000000y^{10}z^7 - 881376385332487285440000000000y^8z^9 \\
& - 14167250685260123417395200000000y^6z^{11} - 13199373876183505527767040000000y^4z^{13} \\
& - 6548418078853175193894912000000y^2z^{15} - 137025567859093450449223680000z^{17}
\end{aligned}$$

$$\begin{aligned}
Q_{16}(x, y, z) = & -120728921996008300781250000x^{16} - 479094450739013671875000000x^{14}y^2 \\
& - 14322934707636752929687500000x^{14}z^2 + 6412742176713574218750000000x^{12}y^4 \\
& + 42620165914554711914062500000x^{12}y^2z^2 - 215654496120646523437500000000x^{12}z^4 \\
& - 1630721746423388671875000000x^{10}y^6 + 270787996908953129882812500000x^{10}y^4z^2 \\
& + 1046192436771108609375000000000x^{10}y^2z^4 - 1000026391327211826000000000000x^{10}z^6 \\
& - 40704911588021704101562500000x^8y^8 - 491788761409608881835937500000x^8y^6z^2 \\
& + 1678368515042438085937500000000x^8y^4z^4 + 5934904770441307338000000000000x^8y^2z^6 \\
& - 1659051053614534982400000000000x^8z^8 + 23144249930541943359375000000x^6y^{10} \\
& - 504853145716506547851562500000x^6y^8z^2 - 454875967114240218750000000000x^6y^6z^4 \\
& + 10317876114916708380000000000000x^6y^4z^6 + 13587258661020174873600000000000x^6y^2z^8 \\
& - 511893727889788509511680000000x^6z^{10} + 30047407312331250000000000000x^4y^{12} \\
& + 233327660511706831054687500000x^4y^{10}z^2 + 883975881981510773437500000000x^4y^8z^4 \\
& + 9970063841853870660000000000000x^4y^6z^6 + 2102662711089685152000000000000x^4y^4z^8 \\
& + 7462570416780587861975040000000x^4y^2z^{10} + 849359984443087306752000000000x^4z^{12} \\
& + 15798323047603271484375000000x^2y^{14} + 514385102256612670898437500000x^2y^{12}z^2 \\
& + 3733423986300304359375000000000x^2y^{10}z^4 + 14542509385929168342000000000000x^2y^8z^6 \\
& + 18313101762054619622400000000000x^2y^6z^8 - 7254343763900237522903040000000x^2y^4z^{10} \\
& - 14158344167034709471395840000000x^2y^2z^{12} + 340038942375813492768768000000x^2z^{14} \\
& + 86397194755700683593750000y^{16} - 20514286364100161132812500000y^{14}z^2 \\
& - 86223763519493758593750000000y^{12}z^4 - 518338005051984161400000000000y^{10}z^6
\end{aligned}$$

$$\begin{aligned}
& - 1578270027879998386560000000000y^8z^8 - 27800430353077992178360320000000y^6z^{10} \\
& - 27879526232475882527784960000000y^4z^{12} - 14565623111127293963010048000000y^2z^{14} \\
& - 167429003746910461231104000000z^{16}
\end{aligned}$$

$$\begin{aligned}
Q_{15}(x, y, z) = & - 4768790649751010742187500000x^{14}z + 4572293158091469726562500000x^{12}y^2z \\
& - 155113746978699035156250000000x^{12}z^3 + 128105396175960043945312500000x^{10}y^4z \\
& + 595615484488127554687500000000x^{10}y^2z^3 - 116393756155760660670000000000x^{10}z^5 \\
& - 158122471294656342773437500000x^8y^6z + 1314637028311279113281250000000x^8y^4z^3 \\
& + 5198608084736685570300000000000x^8y^2z^5 - 2966967436380430645440000000000x^8z^7 \\
& - 319856000642076665039062500000x^6y^8z - 1050890518420379296875000000000x^6y^6z^3 \\
& + 8270339031458793282600000000000x^6y^4z^5 + 15021714267901845884160000000000x^6y^2z^7 \\
& - 2073934494021661304832000000000x^6z^9 + 58872925451288979492187500000x^4y^{10}z \\
& - 106508262803235996093750000000x^4y^8z^3 + 722467533507910279740000000000x^4y^6z^5 \\
& + 22425092820965428824960000000000x^4y^4z^7 + 10286534047224722798592000000000x^4y^2z^9 \\
& + 1530414138992044044976128000000x^4z^{11} + 218955527773790756835937500000x^2y^{12}z \\
& + 2763753626565098367187500000000x^2y^{10}z^3 + 15449971359348943589700000000000x^2y^8z^5 \\
& + 24211560717957138197760000000000x^2y^6z^7 - 8888096539331495589888000000000x^2y^4z^9 \\
& - 21292594110690314549723136000000x^2y^2z^{11} + 18962274593365751318446080000000x^2z^{13} \\
& - 12932921237790981445312500000y^{14}z - 814136132629629457031250000000y^{12}z^3 \\
& - 5775128330119518633300000000000y^{10}z^5 - 20569493893911083317440000000000y^8z^7
\end{aligned}$$

$$\begin{aligned}
& - 41062438841670497359872000000000y^6z^9 - 45491135930194739611041792000000y^4z^{11} \\
& - 25549040402736614580682752000000y^2z^{13} + 216187596842807796432896000000z^{15} \\
Q_{14}(x, y, z) = & - 646930080070813476562500000x^{14} - 1003770245732915039062500000x^{12}y^2 \\
& - 68553424772021995312500000000x^{12}z^2 + 22009520325108788085937500000x^{10}y^4 \\
& + 199531219718330578125000000000x^{10}y^2z^2 - 90485731587640740750000000000x^{10}z^4 \\
& - 9570533827501836914062500000x^8y^6 + 736388315618388145312500000000x^8y^4z^2 \\
& + 3348629080019153887500000000000x^8y^2z^4 - 3490776097559644380480000000000x^8z^6 \\
& - 78448190639191620117187500000x^6y^8 - 725298725201740706250000000000x^6y^6z^2 \\
& + 4990233600194636745000000000000x^6y^4z^4 + 12978068181525131235840000000000x^6y^2z^6 \\
& - 38994414329475586252800000000000x^6z^8 + 7459543076322559570312500000x^4y^{10} \\
& - 4804263251526234796875000000000x^4y^8z^2 + 2921761173528852435000000000000x^4y^6z^4 \\
& + 173547775890825532588800000000000x^4y^4z^6 + 11318931930454385577984000000000x^4y^2z^8 \\
& + 19269116331510355845120000000000x^4z^{10} + 40615802753625395507812500000x^2y^{12} \\
& + 13208239986123370781250000000000x^2y^{10}z^2 + 11786904013564496182500000000000x^2y^8z^4 \\
& + 23646166772477949757440000000000x^2y^6z^6 - 8767640214174635900928000000000x^2y^4z^8 \\
& - 249806871518003554959360000000000x^2y^2z^{10} + 4852797319026572275482624000000x^2z^{12} \\
& - 3327253667872057617187500000y^{14} - 490551542865022120312500000000y^{12}z^2 \\
& - 4388143923894599842500000000000y^{10}z^4 - 19482837394207797103680000000000y^8z^6 \\
& - 45894577263910639067136000000000y^6z^8 - 5784377329800439616716800000000y^4z^{10} \\
& - 35693193769639091866435584000000y^2z^{12} + 1523477416831621225512960000000z^{14}
\end{aligned}$$

$$\begin{aligned}
Q_{13}(x, y, z) = & -17054064905530023632812500000x^{12}z + 31750762126385541796875000000x^{10}y^2z \\
& - 473358922307377914375000000000x^{10}z^3 + 240686798742166663476562500000x^8y^4z \\
& + 1522283461343067594375000000000x^8y^2z^3 - 2880510833222961922584000000000x^8z^5 \\
& - 212301994142044511718750000000x^6y^6z + 2343708455489638031250000000000x^6y^4z^3 \\
& + 8832818921061005739936000000000x^6y^2z^5 - 4847400309675731175936000000000x^6z^7 \\
& - 287570921724241606054687500000x^4y^8z + 177612500295797163750000000000x^4y^6z^3 \\
& + 9649511535035128774896000000000x^4y^4z^5 + 10293472600483385700864000000000x^4y^2z^7 \\
& + 1620549057956375220019200000000x^4z^9 + 378796401863276776171875000000x^2y^{10}z \\
& + 6286305797198241823125000000000x^2y^8z^3 + 16834016143938917720736000000000x^2y^6z^5 \\
& - 7213471509743009717760000000000x^2y^4z^7 - 22862699162405384642150400000000x^2y^2z^9 \\
& + 8323370005226631319388160000000x^2z^{11} - 171560662297125027539062500000y^{12}z \\
& - 2162301025216281298125000000000y^{10}z^3 - 13264255389794173752984000000000y^8z^5 \\
& - 38787639229596323731968000000000y^6z^7 - 57589574859732955685068800000000y^4z^9 \\
& - 39999825272982715963146240000000y^2z^{11} + 3909793605488238922825728000000z^{13}
\end{aligned}$$

$$\begin{aligned}
Q_{12}(x, y, z) = & -1825535155440755390625000000x^{12} + 1084645309848194531250000000x^{10}y^2 \\
& - 160704553031079622875000000000x^{10}z^2 + 32860269969540348515625000000x^8y^4 \\
& + 453204881419356714375000000000x^8y^2z^2 - 1693550434091957740800000000000x^8z^4 \\
& - 17683098921591044062500000000x^6y^6 + 835009659274169126250000000000x^6y^4z^2 \\
& + 4660377008797807862400000000000x^6y^2z^4 - 4336446563257727476684800000000x^6z^6
\end{aligned}$$

$$\begin{aligned}
& - 61304248248138542109375000000x^4y^8 - 40598876404979096625000000000x^4y^6z^2 \\
& + 380767002070191406560000000000x^4y^4z^4 + 7869301067295737456486400000000x^4y^2z^6 \\
& + 687801388755618953625600000000x^4z^8 + 51291126388064257031250000000x^2y^{10} \\
& + 218812246356831566062500000000x^2y^8z^2 + 844882207914847092480000000000x^2y^6z^4 \\
& - 5109832499137426424678400000000x^2y^4z^6 - 16150617813806539259904000000000x^2y^2z^8 \\
& + 10462670850417782095872000000000x^2z^{10} - 26710127085923083515625000000y^{12} \\
& - 61699845388338791212500000000y^{10}z^2 - 636380442634178311200000000000y^8z^4 \\
& - 24625374609870462083123200000000y^6z^6 - 44964272017417726294425600000000y^4z^8 \\
& - 36135652107816916274380800000000y^2z^{10} + 6660595229397910342860800000000z^{12}
\end{aligned}$$

$$\begin{aligned}
Q_{11}(x, y, z) = & - 32036050443263462718750000000x^{10}z + 77355349799800918218750000000x^8y^2z \\
& - 699618478832164108125000000000x^8z^3 + 195491857224550374562500000000x^6y^4z \\
& + 1826753401058296686300000000000x^6y^2z^3 - 2866446808145802757440000000000x^6z^5 \\
& - 169162362915705290812500000000x^4y^6z + 1066076053611484802850000000000x^4y^4z^3 \\
& + 4990110949525279273920000000000x^4y^2z^5 - 2801369115485442736128000000000x^4z^7 \\
& + 429262735401647711156250000000x^2y^8z + 2825031598587207171900000000000x^2y^6z^3 \\
& - 3093306861049817008320000000000x^2y^4z^5 - 8530436506502424991334400000000x^2y^2z^7 \\
& + 9965816039349122170060800000000x^2z^9 - 73616262217717000406250000000y^{10}z \\
& - 2098499318343031082925000000000y^8z^3 - 11582460904911213888960000000000y^6z^5 \\
& - 27494351320421078822092800000000y^4z^7 - 26388910557353323111219200000000y^2z^9 \\
& + 8427684606539767401676800000000z^{11}
\end{aligned}$$

$$\begin{aligned}
Q_{10}(x, y, z) = & -2845795611407924148750000000x^{10} + 5575869385061838243750000000x^8y^2 \\
& - 193780455745112338050000000000x^8z^2 + 21245638514208447262500000000x^6y^4 \\
& + 494789316957465021900000000000x^6y^2z^2 - 1398562878577176265680000000000x^6z^4 \\
& - 204310144456286297625000000000x^4y^6 + 217200140097345021600000000000x^4y^4z^2 \\
& + 2514759731670891734640000000000x^4y^2z^4 - 739383010509893531904000000000x^4z^6 \\
& + 32834936678161748006250000000x^2y^8 + 575916548749992753300000000000x^2y^6z^2 \\
& - 1514250602542801560240000000000x^2y^4z^4 - 3085034483512061729280000000000x^2y^2z^6 \\
& + 7273505955810353607475200000000x^2z^8 + 1637882295468520398750000000y^{10} \\
& - 46736990257652905875000000000y^8z^2 - 393149164931908942872000000000y^6z^4 \\
& - 13111015748534362634496000000000y^4z^6 - 15576088719911908766515200000000y^2z^8 \\
& + 8256486678748625240064000000000z^{10}
\end{aligned}$$

$$\begin{aligned}
Q_9(x, y, z) = & -32375359040802809276250000000x^8z + 81836932691170903005000000000x^6y^2z \\
& - 491909643508372310520000000000x^6z^3 + 31643323989130704892500000000x^4y^4z \\
& + 947395952015790771720000000000x^4y^2z^3 - 655581110995323154368000000000x^4z^5 \\
& + 62737126366237678305000000000x^2y^6z - 557166680519392862280000000000x^2y^4z^3 \\
& - 528217925063917373568000000000x^2y^2z^5 + 4054291175602460169216000000000x^2z^7 \\
& - 70376573096852489426250000000y^8z - 91256756338850211092000000000y^6z^3 \\
& - 4842197171754182885568000000000y^4z^5 - 7394494057137923134464000000000y^2z^7 \\
& + 6376402335080409113395200000000z^9
\end{aligned}$$

$$\begin{aligned}
Q_8(x, y, z) = & -2467859796156521250000000000x^8 + 621249459837993000000000000x^6y^2 \\
& - 118269445613593597200000000000x^6z^2 + 237606326271956250000000000x^4y^4 \\
& + 246808970969867179200000000000x^4y^2z^2 - 35993190802672496160000000000x^4z^4 \\
& + 3157484324572170000000000000x^2y^6 - 14332406075223290280000000000x^2y^4z^2 \\
& + 145358019945088675200000000000x^2y^2z^4 + 1694739450485996789760000000000x^2z^6 \\
& - 6294858138845141250000000000y^8 - 12679715622557143920000000000y^6z^2 \\
& - 137348298091767708960000000000y^4z^4 - 278548172093783844864000000000y^2z^6 \\
& + 390585053100835676160000000000z^8
\end{aligned}$$

$$\begin{aligned}
Q_7(x, y, z) = & -17414356721065053750000000000x^6z + 39407506419473066250000000000x^4y^2z \\
& - 131898477683024460000000000000x^4z^3 - 23393730091882196250000000000x^2y^4z \\
& + 132949362509244504000000000000x^2y^2z^3 + 50926160102173603200000000000x^2z^5 \\
& - 6206197885217816250000000000y^6z - 2970405386283437400000000000y^4z^3 \\
& - 80831784935583100800000000000y^2z^5 + 189360012517107240960000000000z^7
\end{aligned}$$

$$\begin{aligned}
Q_6(x, y, z) = & -1184685692986125000000000000x^6 + 2909545155309375000000000000x^4y^2 \\
& - 31657243166240175000000000000x^4z^2 - 1884656505346875000000000000x^2y^4 \\
& + 43789075540862850000000000000x^2y^2z^2 + 9940766450333904000000000000x^2z^4 \\
& + 4916132255236250000000000000y^6 - 4853169620770717500000000000y^4z^2 \\
& - 169648844712272160000000000000y^2z^4 + 71939536590556160000000000000z^6
\end{aligned}$$

$$\begin{aligned}
Q_5(x, y, z) = & -453262921209450000000000000000x^4z + 755140610362050000000000000000x^2y^2z \\
& + 8564179459176000000000000000000x^2z^3 - 569057997827700000000000000000y^4z \\
& - 2197967860412400000000000000000y^2z^3 + 2100395527166928000000000000000z^5
\end{aligned}$$

$$\begin{aligned}
Q_4(x, y, z) = & -294918675046875000000000000000x^4 + 566411530781250000000000000000x^2y^2 \\
& - 1047737125710000000000000000000x^2z^2 - 370662754171875000000000000000y^4 \\
& - 7259679230100000000000000000000y^2z^2 + 455762202852000000000000000000z^4
\end{aligned}$$

$$\begin{aligned}
Q_3(x, y, z) = & -361114067531250000000000000000x^2z + 245702029031250000000000000000y^2z \\
& + 6933791489900000000000000000000z^3
\end{aligned}$$

$$\begin{aligned}
Q_2(x, y, z) = & -297509695312500000000000000000x^2 + 297509695312500000000000000000y^2 \\
& + 6609912375000000000000000000000z^2
\end{aligned}$$

$$Q_1(x, y, z) = 297509695312500000000000000000z$$

B Algebraic Equation of Chen's Non-Minimal Surface in Inhomogeneous Tangential Coordinates

$$\widehat{Q}(a, b, c) = \widehat{Q}_{24}(a, b, c) + \widehat{Q}_{23}(a, b, c) + \widehat{Q}_{22}(a, b, c) + \cdots + \widehat{Q}_{16}(a, b, c)$$

with

$$\begin{aligned}\widehat{Q}_{24}(a, b, c) &= \text{terms of degree 24} \\ \widehat{Q}_{23}(a, b, c) &= \text{terms of degree 23} \\ \widehat{Q}_{22}(a, b, c) &= \text{terms of degree 22} \\ &\dots\dots\dots \\ \widehat{Q}_{16}(a, b, c) &= \text{terms of degree 16}\end{aligned}$$

where

$$\begin{aligned}\widehat{Q}_{24}(a, b, c) &= 16122904576a^{24} - 41867542528a^{22}b^2 - 260118282240a^{22}c^2 \\ &\quad - 638279745536a^{20}b^4 - 1588005273600a^{20}b^2c^2 + 1176561496320a^{20}c^4 \\ &\quad - 354555002880a^{18}b^6 - 8214910402560a^{18}b^4c^2 + 5509216519680a^{18}b^2c^4 \\ &\quad - 726109236720a^{18}c^6 + 7966641094656a^{16}b^8 - 24487194624000a^{16}b^6c^2 \\ &\quad + 10231314720000a^{16}b^4c^4 + 8680520394000a^{16}b^2c^6 - 2212118126775a^{16}c^8 \\ &\quad + 25940100907008a^{14}b^{10} - 18537366159360a^{14}b^8c^2 - 20785358039040a^{14}b^6c^4 \\ &\quad + 47515117334400a^{14}b^4c^6 - 428422665600a^{14}b^2c^8 + 1352539787400a^{14}c^{10} \\ &\quad + 32780266242048a^{12}b^{12} + 26970696253440a^{12}b^{10}c^2 - 34833732963840a^{12}b^8c^4 \\ &\quad + 49136125178880a^{12}b^6c^6 + 76048844339700a^{12}b^4c^8 - 16858940789016a^{12}b^2c^{10}\end{aligned}$$

$$\begin{aligned}
& + 1942881033600a^{12}c^{12} + 14763115413504a^{10}b^{14} + 23653788549120a^{10}b^{12}c^2 \\
& - 37453871508480a^{10}b^{10}c^4 - 14705648102880a^{10}b^8c^6 + 143225225276400a^{10}b^6c^8 \\
& + 103689943631496a^{10}b^4c^{10} - 12694435810560a^{10}b^2c^{12} - 406731456000a^{10}c^{14} \\
& - 3110023987200a^8b^{16} - 29614529249280a^8b^{14}c^2 - 121580418424320a^8b^{12}c^4 \\
& - 209020644344160a^8b^{10}c^6 - 85083004501650a^8b^8c^8 + 118104936364584a^8b^6c^{10} \\
& + 93812655634560a^8b^4c^{12} + 3256039503360a^8b^2c^{14} - 763572096000a^8c^{16} \\
& - 3280516153344a^6b^{18} - 26265564610560a^6b^{16}c^2 - 103673799936000a^6b^{14}c^4 \\
& - 244187076176640a^6b^{12}c^6 - 321408998192160a^6b^{10}c^8 - 191606556118824a^6b^8c^{10} \\
& - 4606940966400a^6b^6c^{12} + 34294403220480a^6b^4c^{14} + 5266902528000a^6b^2c^{16} \\
& - 167961600000a^6c^{18} + 113217896448a^4b^{20} + 270264729600a^4b^{18}c^2 \\
& - 4844602172160a^4b^{16}c^4 - 36289409166720a^4b^{14}c^6 - 105575767848540a^4b^{12}c^8 \\
& - 153263191282056a^4b^{10}c^{10} - 111048738687360a^4b^8c^{12} - 32149222548480a^4b^6c^{14} \\
& + 940398336000a^4b^4c^{16} + 1175731200000a^4b^2c^{18} + 108546490368a^2b^{22} \\
& + 1275373486080a^2b^{20}c^2 + 6230507558400a^2b^{18}c^4 + 15825619613520a^2b^{16}c^6 \\
& + 20572685071920a^2b^{14}c^8 + 8281461245976a^2b^{12}c^{10} - 11271694890240a^2b^{10}c^{12} \\
& - 15909022287360a^2b^8c^{14} - 7341414912000a^2b^6c^{16} - 1175731200000a^2b^4c^{18} \\
& + 6879707136b^{24} + 99970744320b^{22}c^2 + 643939580160b^{20}c^4 \\
& + 2387049788880b^{18}c^6 + 5548914738225b^{16}c^8 + 8276484987000b^{14}c^{10} \\
& + 7794740937600b^{12}c^{12} + 4395135168000b^{10}c^{14} + 1337814144000b^8c^{16} \\
& + 167961600000b^6c^{18}
\end{aligned}$$

$$\begin{aligned}
\widehat{Q}_{23}(a, b, c) = & 581094604800a^{22}c + 7881051340800a^{20}b^2c - 4298050252800a^{20}c^3 \\
& + 42653653401600a^{18}b^4c - 33736653619200a^{18}b^2c^3 - 1949578701120a^{18}c^5 \\
& + 123270502809600a^{16}b^6c - 79762586112000a^{16}b^4c^3 - 85981570286400a^{16}b^2c^5 \\
& + 15134428233900a^{16}c^7 + 222524316057600a^{14}b^8c - 23254577971200a^{14}b^6c^3 \\
& - 453304486321920a^{14}b^4c^5 - 23953848415200a^{14}b^2c^7 + 5017449830400a^{14}c^9 \\
& + 275506672435200a^{12}b^{10}c + 259837247692800a^{12}b^8c^3 - 813330601562880a^{12}b^6c^5 \\
& - 797546332746000a^{12}b^4c^7 + 101821311057600a^{12}b^2c^9 - 17164603231200a^{12}c^{11} \\
& + 234460348416000a^{10}b^{12}c + 576887530291200a^{10}b^{10}c^3 - 356810340159360a^{10}b^8c^5 \\
& - 1750602914114400a^{10}b^6c^7 - 954251685648000a^{10}b^4c^9 + 145533400574400a^{10}b^2c^{11} \\
& - 8119123776000a^{10}c^{13} + 124940294553600a^8b^{14}c + 546230991052800a^8b^{12}c^3 \\
& + 508961379346560a^8b^{10}c^5 - 953521082587800a^8b^8c^7 - 2000917096804800a^8b^6c^9 \\
& - 924551898170400a^8b^4c^{11} + 46587742272000a^8b^2c^{13} + 5910008832000a^8c^{15} \\
& + 33256164556800a^6b^{16}c + 236825159270400a^6b^{14}c^3 + 606141548663040a^6b^{12}c^5 \\
& + 450229964738400a^6b^{10}c^7 - 631259445139200a^6b^8c^9 - 1239926083862400a^6b^6c^{11} \\
& - 602422979097600a^6b^4c^{13} - 37112277565440a^6b^2c^{15} + 4369987584000a^6c^{17} \\
& + 276568473600a^4b^{18}c + 22654138060800a^4b^{16}c^3 + 157432235869440a^4b^{14}c^5 \\
& + 417943745146800a^4b^{12}c^7 + 448791220641600a^4b^{10}c^9 + 29382245791200a^4b^8c^{11} \\
& - 297945089510400a^4b^6c^{13} - 186541507215360a^4b^4c^{15} - 26439395328000a^4b^2c^{17} \\
& + 671846400000a^4c^{19} - 1686483763200a^2b^{20}c - 13078908518400a^2b^{18}c^3 \\
& - 35460876237120a^2b^{16}c^5 - 24400789984800a^2b^{14}c^7 + 61705011772800a^2b^{12}c^9
\end{aligned}$$

$$\begin{aligned}
& + 133859487384000a^2b^{10}c^{11} + 85018606732800a^2b^8c^{13} + 247358914560a^2b^6c^{15} \\
& - 16708073472000a^2b^4c^{17} - 4031078400000a^2b^2c^{19} - 85996339200b^{22}c \\
& - 1019190988800b^{20}c^3 - 5067789883200b^{18}c^5 - 13342799301300b^{16}c^7 \\
& - 18793149940800b^{14}c^9 - 10855394949600b^{12}c^{11} + 4271683392000b^{10}c^{13} \\
& + 9022897152000b^8c^{15} + 4259506176000b^6c^{17} + 671846400000b^4c^{19}
\end{aligned}$$

$$\begin{aligned}
\widehat{Q}_{22}(a, b, c) = & - 410045644800a^{22} - 8158799462400a^{20}b^2 + 6149716992000a^{20}c^2 \\
& - 52812958924800a^{18}b^4 + 67391336448000a^{18}b^2c^2 + 26585233776000a^{18}c^4 \\
& - 166834313625600a^{16}b^6 + 247463562240000a^{16}b^4c^2 + 35167150552000a^{16}b^2c^4 \\
& - 43852766566500a^{16}c^6 - 285492982579200a^{14}b^8 + 410686156800000a^{14}b^6c^2 \\
& + 1744743360096000a^{14}b^4c^4 + 265544858412000a^{14}b^2c^6 - 58925469168000a^{14}c^8 \\
& - 259697619763200a^{12}b^{10} + 442637789184000a^{12}b^8c^2 + 3891588122016000a^{12}b^6c^4 \\
& + 3291557578218000a^{12}b^4c^6 - 228364045200000a^{12}b^2c^8 + 48249439344000a^{12}c^{10} \\
& - 110756207001600a^{10}b^{12} + 465754116096000a^{10}b^{10}c^2 + 4859505935424000a^{10}b^8c^4 \\
& + 8615584015668000a^{10}b^6c^6 + 3940356146256000a^{10}b^4c^8 - 633811963104000a^{10}b^2c^{10} \\
& + 58406033664000a^{10}c^{12} - 29090827468800a^8b^{14} + 266071910400000a^8b^{12}c^2 \\
& + 3260599980480000a^8b^{10}c^4 + 9459042314553000a^8b^8c^6 + 10797438230064000a^8b^6c^8 \\
& + 3947367807273600a^8b^4c^{10} - 401736713472000a^8b^2c^{12} - 8545512960000a^8c^{14} \\
& - 29780213760000a^6b^{16} - 94525304832000a^6b^{14}c^2 + 531363538080000a^6b^{12}c^4 \\
& + 3583198911924000a^6b^{10}c^6 + 8026946142768000a^6b^8c^8 + 7949364981696000a^6b^6c^{10} \\
& + 2980463454720000a^6b^4c^{12} + 46907320320000a^6b^2c^{14} - 21511028736000a^6c^{16}
\end{aligned}$$

$$\begin{aligned}
& -15289299763200a^4b^{18} - 109095330816000a^4b^{16}c^2 - 354563093664000a^4b^{14}c^4 \\
& - 446898792726000a^4b^{12}c^6 + 595020438864000a^4b^{10}c^8 + 2509624762819200a^4b^8c^{10} \\
& + 2815469176320000a^4b^6c^{12} + 1210285255680000a^4b^4c^{14} + 125017178112000a^4b^2c^{16} \\
& - 5374771200000a^4c^{18} + 9555148800a^2b^{20} + 2114076672000a^2b^{18}c^2 \\
& - 14940405936000a^2b^{16}c^4 - 156458927700000a^2b^{14}c^6 - 425925061776000a^2b^{12}c^8 \\
& - 439798542969600a^2b^{10}c^{10} - 14069023488000a^2b^8c^{12} + 292753336320000a^2b^6c^{14} \\
& + 181941977088000a^2b^4c^{16} + 32248627200000a^2b^2c^{18} - 171992678400b^{22} \\
& - 1807266816000b^{20}c^2 - 8833625424000b^{18}c^4 - 29037768934500b^{16}c^6 \\
& - 74060882928000b^{14}c^8 - 139343903683200b^{12}c^{10} - 169253224704000b^{10}c^{12} \\
& - 115742338560000b^8c^{14} - 39880802304000b^6c^{16} - 5374771200000b^4c^{18}
\end{aligned}$$

$$\begin{aligned}
\widehat{Q}_{21}(a, b, c) = & -5106032640000a^{20}c - 53037711360000a^{18}b^2c - 67627215360000a^{18}c^3 \\
& - 257026867200000a^{16}b^4c - 762007184640000a^{16}b^2c^3 + 36383217930000a^{16}c^5 \\
& - 769454899200000a^{14}b^6c - 3413893616640000a^{14}b^4c^3 - 953371992600000a^{14}b^2c^5 \\
& + 173973235320000a^{14}c^7 - 1418813521920000a^{12}b^8c - 8238502932480000a^{12}b^6c^3 \\
& - 7501313747376000a^{12}b^4c^5 + 109229715000000a^{12}b^2c^7 - 15797594160000a^{12}c^9 \\
& - 1488758538240000a^{10}b^{10}c - 11155157084160000a^{10}b^8c^3 - 19575979377912000a^{10}b^6c^5 \\
& - 9236938696200000a^{10}b^4c^7 + 1258623485280000a^{10}b^2c^9 - 156753273600000a^{10}c^{11} \\
& - 777789112320000a^8b^{12}c - 7983076262400000a^8b^{10}c^3 - 22513961286540000a^8b^8c^5 \\
& - 25121145693960000a^8b^6c^7 - 8784245687760000a^8b^4c^9 + 1222283001600000a^8b^2c^{11} \\
& - 29217853440000a^8c^{13} - 128251330560000a^6b^{14}c - 2453964180480000a^6b^{12}c^3
\end{aligned}$$

$$\begin{aligned}
& -10867644957384000a^6b^{10}c^5 - 21444967206360000a^6b^8c^7 - 19945695234240000a^6b^6c^9 \\
& - 6846410718720000a^6b^4c^{11} + 212313415680000a^6b^2c^{13} + 45697499136000a^6c^{15} \\
& + 21621841920000a^4b^{16}c - 35512473600000a^4b^{14}c^3 - 996703304832000a^4b^{12}c^5 \\
& - 4515487815960000a^4b^{10}c^7 - 9075899152080000a^4b^8c^9 - 8560901767680000a^4b^6c^{11} \\
& - 3342819041280000a^4b^4c^{13} - 258490662912000a^4b^2c^{15} + 16124313600000a^4c^{17} \\
& + 4001218560000a^2b^{18}c + 87692751360000a^2b^{16}c^3 + 508774086360000a^2b^{14}c^5 \\
& + 1183320760680000a^2b^{12}c^7 + 1033782069600000a^2b^{10}c^9 - 266180878080000a^2b^8c^{11} \\
& - 1055336325120000a^2b^6c^{13} - 585945612288000a^2b^4c^{15} - 96745881600000a^2b^2c^{17} \\
& + 1612431360000b^{20}c + 16149507840000b^{18}c^3 + 75428943282000b^{16}c^5 \\
& + 220548539880000b^{14}c^7 + 431313316560000b^{12}c^9 + 532698612480000b^{10}c^{11} \\
& + 363737640960000b^8c^{13} + 123189755904000b^6c^{15} + 16124313600000b^4c^{17}
\end{aligned}$$

$$\begin{aligned}
\widehat{Q}_{20}(a, b, c) = & 2020515840000a^{20} + 14073937920000a^{18}b^2 + 75993292800000a^{18}c^2 \\
& + 44013404160000a^{16}b^4 + 824490835200000a^{16}b^2c^2 + 72311636250000a^{16}c^4 \\
& + 93162700800000a^{14}b^6 + 3538419033600000a^{14}b^4c^2 + 1788673719600000a^{14}b^2c^4 \\
& - 268922138400000a^{14}c^6 + 183876894720000a^{12}b^8 + 7883510976000000a^{12}b^6c^2 \\
& + 10215178644600000a^{12}b^4c^4 + 546608930400000a^{12}b^2c^6 - 125744140800000a^{12}c^8 \\
& + 328338800640000a^{10}b^{10} + 10356801523200000a^{10}b^8c^2 + 23880574515600000a^{10}b^6c^4 \\
& + 12884877036000000a^{10}b^4c^6 - 1240495948800000a^{10}b^2c^8 + 222305264640000a^{10}c^{10} \\
& + 390221660160000a^8b^{12} + 8433774950400000a^8b^{10}c^2 + 28219038608700000a^8b^8c^4 \\
& + 33026059951200000a^8b^6c^6 + 11755660377600000a^8b^4c^8 - 1962641249280000a^8b^2c^{10}
\end{aligned}$$

$$\begin{aligned}
& + 91707033600000a^8c^{12} + 232933294080000a^6b^{14} + 3900127449600000a^6b^{12}c^2 \\
& + 16527955554000000a^6b^{10}c^4 + 31110518685600000a^6b^8c^6 + 28478237644800000a^6b^6c^8 \\
& + 9313391093760000a^6b^4c^{10} - 673190092800000a^6b^2c^{12} - 51060326400000a^6c^{14} \\
& + 36074004480000a^4b^{16} + 561001075200000a^4b^{14}c^2 + 2760068892600000a^4b^{12}c^4 \\
& + 7995211207200000a^4b^{10}c^6 + 14306766912000000a^4b^8c^8 + 13113359308800000a^4b^6c^{10} \\
& + 5009809305600000a^4b^4c^{12} + 285758668800000a^4b^2c^{14} - 21499084800000a^4c^{16} \\
& - 10689822720000a^2b^{18} - 157687948800000a^2b^{16}c^2 - 921500614800000a^2b^{14}c^4 \\
& - 2339706837600000a^2b^{12}c^6 - 2506378982400000a^2b^{10}c^8 - 476380154880000a^2b^8c^{10} \\
& + 1214548992000000a^2b^6c^{12} + 789195571200000a^2b^4c^{14} + 128994508800000a^2b^2c^{16} \\
& + 1612431360000b^{20} + 10875513600000b^{18}c^2 + 21049328250000b^{16}c^4 \\
& - 37786111200000b^{14}c^6 - 273693427200000b^{12}c^8 - 549200839680000b^{10}c^{10} \\
& - 453832243200000b^8c^{12} - 163930521600000b^6c^{14} - 21499084800000b^4c^{16}
\end{aligned}$$

$$\begin{aligned}
\widehat{Q}_{19}(a, b, c) = & - 38631168000000a^{18}c - 384445440000000a^{16}b^2c - 177322932000000a^{16}c^3 \\
& - 1643410944000000a^{14}b^4c - 2084002992000000a^{14}b^2c^3 + 240593328000000a^{14}c^5 \\
& - 4079973888000000a^{12}b^6c - 9116504640000000a^{12}b^4c^3 - 1035802857600000a^{12}b^2c^5 \\
& + 199757664000000a^{12}c^7 - 6319088640000000a^{10}b^8c - 20606574960000000a^{10}b^6c^3 \\
& - 11780269084800000a^{10}b^4c^5 + 694287936000000a^{10}b^2c^7 - 167899392000000a^{10}c^9 \\
& - 5871564288000000a^8b^{10}c - 25147372104000000a^8b^8c^3 - 29285768246400000a^8b^6c^5 \\
& - 10706128992000000a^8b^4c^7 + 1710906624000000a^8b^2c^9 - 85100544000000a^8c^{11} \\
& - 2850494976000000a^6b^{12}c - 14817241872000000a^6b^{10}c^3 - 26732196720000000a^6b^8c^5
\end{aligned}$$

$$\begin{aligned}
& - 24288087168000000a^6b^6c^7 - 7831613952000000a^6b^4c^9 + 689762304000000a^6b^2c^{11} \\
& + 26873856000000a^6c^{13} - 451256832000000a^4b^{14}c - 2373460704000000a^4b^{12}c^3 \\
& - 5543504956800000a^4b^{10}c^5 - 10067688288000000a^4b^8c^7 - 9686158848000000a^4b^6c^9 \\
& - 3875807232000000a^4b^4c^{11} - 152285184000000a^4b^2c^{13} + 10749542400000a^4c^{15} \\
& + 54307584000000a^2b^{16}c + 618600240000000a^2b^{14}c^3 + 2185360041600000a^2b^{12}c^5 \\
& + 3045003840000000a^2b^{10}c^7 + 1772741376000000a^2b^8c^9 - 176173056000000a^2b^6c^{11} \\
& - 385191936000000a^2b^4c^{13} - 64497254400000a^2b^2c^{15} - 10077696000000b^{18}c \\
& - 74559204000000b^{16}c^3 - 221436374400000b^{14}c^5 - 261390240000000b^{12}c^7 \\
& + 28553472000000b^{10}c^9 + 174680064000000b^8c^{11} + 80621568000000b^6c^{13} \\
& + 10749542400000b^4c^{15}
\end{aligned}$$

$$\begin{aligned}
\widehat{Q}_{18}(a, b, c) = & 7091712000000a^{18} + 63452160000000a^{16}b^2 + 152477640000000a^{16}c^2 \\
& + 274710528000000a^{14}b^4 + 1524251520000000a^{14}b^2c^2 - 123871680000000a^{14}c^4 \\
& + 730073088000000a^{12}b^6 + 6100855200000000a^{12}b^4c^2 + 685143360000000a^{12}b^2c^4 \\
& - 127837440000000a^{12}c^6 + 1247394816000000a^{10}b^8 + 12305986560000000a^{10}b^6c^2 \\
& + 6801744960000000a^{10}b^4c^4 - 210885120000000a^{10}b^2c^6 + 55987200000000a^{10}c^8 \\
& + 1352650752000000a^8b^{10} + 13341924720000000a^8b^8c^2 + 14334822720000000a^8b^6c^4 \\
& + 5319717120000000a^8b^4c^6 - 683043840000000a^8b^2c^8 + 33592320000000a^8c^{10} \\
& + 880865280000000a^6b^{12} + 7514881920000000a^6b^{10}c^2 + 10943398080000000a^6b^8c^4 \\
& + 9245352960000000a^6b^6c^6 + 2799360000000000a^6b^4c^8 - 295612416000000a^6b^2c^{10}
\end{aligned}$$

$$\begin{aligned}
& + 297105408000000a^4b^{14} + 1780043040000000a^4b^{12}c^2 + 1960251840000000a^4b^{10}c^4 \\
& + 2553949440000000a^4b^8c^6 + 2306672640000000a^4b^6c^8 + 1061517312000000a^4b^4c^{10} \\
& + 26500608000000a^2b^{16} + 8398080000000a^2b^{14}c^2 - 601162560000000a^2b^{12}c^4 \\
& - 1061890560000000a^2b^{10}c^6 - 1063756800000000a^2b^8c^8 - 295612416000000a^2b^6c^{10} \\
& - 6718464000000b^{18} - 21782520000000b^{16}c^2 + 39890880000000b^{14}c^4 \\
& + 226748160000000b^{12}c^6 + 167961600000000b^{10}c^8 + 33592320000000b^8c^{10}
\end{aligned}$$

$$\begin{aligned}
\widehat{Q}_{17}(a, b, c) = & - 62985600000000a^{16}c - 587865600000000a^{14}b^2c + 27993600000000a^{14}c^3 \\
& - 2183500800000000a^{12}b^4c - 195955200000000a^{12}b^2c^3 + 33592320000000a^{12}c^5 \\
& - 4283020800000000a^{10}b^6c - 1315699200000000a^{10}b^4c^3 - 67184640000000a^{10}b^2c^5 \\
& - 4828896000000000a^8b^8c - 2659392000000000a^8b^6c^3 - 571069440000000a^8b^4c^5 \\
& - 3107289600000000a^6b^{10}c - 2379456000000000a^6b^8c^3 - 940584960000000a^6b^6c^5 \\
& - 1007769600000000a^4b^{12}c - 811814400000000a^4b^{10}c^3 - 571069440000000a^4b^8c^5 \\
& - 83980800000000a^2b^{14}c + 83980800000000a^2b^{12}c^3 - 67184640000000a^2b^{10}c^5 \\
& + 20995200000000b^{16}c + 83980800000000b^{14}c^3 + 33592320000000b^{12}c^5
\end{aligned}$$

$$\begin{aligned}
\widehat{Q}_{16}(a, b, c) = & 10497600000000a^{16} + 8398080000000a^{14}b^2 + 29393280000000a^{12}b^4 \\
& + 587865600000000a^{10}b^6 + 734832000000000a^8b^8 + 587865600000000a^6b^{10} \\
& + 293932800000000a^4b^{12} + 83980800000000a^2b^{14} + 10497600000000b^{16}
\end{aligned}$$