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Explanation of Polymer Processing & Fiber Formation Software

No.	Title / Trial Version Download / Overview	Note
1	Heating/Cooling of Circular Bar http://www.vector.co.jp/soft/winnt/business/se329660.html This software is usable for simulating temperature distribution and change of a circular rod when the rod is cooled or heated while running in gas or in liquid. This simulation is rather simple but useful, and is applicable to designing, analyzing etc. of heating/cooling processes. The technical explanation of the software, i.e. theory, program etc., is given in the article [1] which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [1] Shirai, T., "Simulation Analysis for Polymer Processing by PC (3)" (in Japanese), Japan Plastics, Vol.50, No.1, P.147 (1999)	Shareware
2	Heating/Cooling of Flat Plate http://www.vector.co.jp/soft/winnt/business/se356189.html This software is usable for simulating temperature distribution and change of a flat plate when the plate is cooled or heated while running in gas or in liquid. This simulation is rather simple but useful, and is applicable to designing, analyzing etc. of heating/cooling processes. The technical explanation of the software, i.e. theory, program etc., is given in the article [1], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [1] Shirai, T., "Simulation Analysis for Polymer Processing by PC (3)" (in Japanese), Japan Plastics, Vol.50, No.1, P.147 (1999)	Shareware
3	Regression of non-Newtonian Viscosity http://www.vector.co.jp/soft/winnt/business/se330880.html An empirical non-Newtonian viscosity equation, which shows shear rate and temperature dependency at a same time, can be obtained using this software. This empirical equation is used e.g. in the plasticating extrusion model by Tadmor. To get the empirical equation is not so difficult, but it needs regression calculation by computer. The formula of the equation is given in the article [2], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [2] Shirai, T., "Simulation Analysis for Polymer Processing by PC (1)" (in Japanese), Japan Plastics, Vol.49, No.11, P.86 (1998)	Shareware

4	Isothermal non-Newtonian Flow in Tube and Slit http://www.vector.co.jp/soft/winnt/business/se391143.html This is a tool to calculate the pressure drop of an isothermal non-Newtonian fluid when the fluids is flowing in slits or tubes. The calculation is not difficult, but the bothersome calculations can be made very quickly and easily, by using this tool.	Shareware
5	Flow and Heat Transfer of Viscous Liquid in Tube http://www.vector.co.jp/soft/winnt/business/se329679.html This software simulates the flow and heat transfer of polymer fluid in a circular tube precisely, considering viscous heat generation and heat transfer of non-Newtonian fluid, and obtains temperature and velocity distribution. This simulation is rather simple but useful, and is applicable to designing, analyzing etc. of viscous liquid heating/cooling processes. The technical explanation of the software, i.e. theory, program etc., is given in the article [3], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [3] Shirai, T., "Simulation Analysis for Polymer Processing by PC (3)" (in Japanese), Japan Plastics, Vol.50, No.1, P.147 (1999)]	Shareware
6	Flow and Heat Transfer of Viscous Liquid in Slit http://www.vector.co.jp/soft/winnt/business/se329678.html This software simulates the flow and heat transfer of polymer fluid in a slit (i.e. between parallel plates) precisely, considering viscous heat generation and heat transfer of non-Newtonian fluid, and obtains temperature and velocity distribution. This simulation is rather simple but useful, and is applicable to designing, analyzing etc. of viscous liquid heating/cooling process. The technical explanation of the software, i.e. theory, program etc., is given in the article [4], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [4] Shirai, T., "Simulation Analysis for Polymer Processing by PC (4)" (in Japanese), Japan Plastics, Vol.50, No.2, P.86 (1999)	Shareware

7	Solid Conveying in Extruder http://www.vector.co.jp/soft/winnt/business/se332624.html This software is used for calculating solid conveying performance of a screw extruder, such as solid conveying zone of a plasticating extruder or a solid screw feeder. To improve solid conveying performance, grooved feed zone is sometimes adopted in extruder. Calculation of such grooved feed zoon needs to handle friction coefficients of the solid plug with barrel, and with screw separately. This software can handle cases with different friction coefficients. This software is rather simple but useful when analyzing solid conveying performance of an extruder. The technical explanation of the software, i.e. theory, calculation example etc., is given in the article [5], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [5] Shirai, T., "Simulation Analysis for Polymer Processing by PC (6)" (in Japanese), Japan Plastics, Vol.50, No.4, P.122 (1999)	Shareware
8	Melt Extruder (Newtonian Flow) http://www.vector.co.jp/soft/winnt/business/se333135.html This software is used for calculating melt conveying and mixing performances of a screw extruder, such as metering zone of a plasticating extruder or a screw pump. This software treats Newtonian fluid, and is rather simple but useful giving unexpectedly good answer to the performance of a extruder including out-put performance of a plasticating extruder. The technical explanation of the software, i.e. theory, calculation example etc., is given in the article [6], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [6] Shirai, T., "Simulation Analysis for Polymer Processing by PC (4)" (in Japanese), Japan Plastics, Vol.50, No.2, P.86 (1999)	Shareware
9	Melt Extruder (Non-Newtonian Flow) http://www.vector.co.jp/soft/winnt/business/se333138.html This software simulates temperature, velocity and viscosity changes in an extruder precisely when extruding non-Newtonian fluid, considering viscous heat generation and heat transfer based on non-Newtonian and non-isothermal two-dimensional extrusion theory by Fenner. This software becomes an important tool when temperature rise in an extruder is a problem, and can be utilized for designing, process analysis, scale-up etc. The technical explanation of the software, i.e. theory, program etc., is given in the article [7], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [7] Shirai, T., "Simulation Analysis for Polymer Processing by PC (5)" (in Japanese), Japan Plastics, Vol.50, No.3, P.90 (1999)	Shareware

10	Plasticating Extruder (Tadmor Model) http://www.vector.co.jp/soft/winnt/business/se329677.html This software simulates the melting process in the screw when a plasticating extruder melts solid pellets or flakes into molten fluid. This software is advanced one based on Tadmor model, and can be used for designing, process analysis, scale-up etc. The technical explanation of the software, i.e. theory, program etc., is given in the article [8], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [8] Shirai, T., "Simulation Analysis for Polymer Processing by PC (5)" (in Japanese), Japan Plastics, Vol.50, No.3, P.90 (1999)	Shareware
11	Plasticating Extruder (Donovan Model) http://www.vector.co.jp/soft/winnt/business/se359383.html This software simulates the melting process in the screw when a plasticating extruder melts solid pellets or flakes into molten fluid. This software is advanced one based on Donovan model, and can be used for designing, process analysis, scale-up etc. Donovan model usually delivers more realistic result than Tadmor mode. The technical explanation of the software, i.e. theory, program etc., is given in the article [9], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [9] Shirai, T., "Simulation Analysis for Polymer Processing by PC (6)" (in Japanese), Japan Plastics, Vol.50, No.4, P.122 (1999)	Shareware
12	Plasticating Extruder (Chung Model) http://www.vector.co.jp/soft/winnt/edu/se368523.html This software simulates the melting process in the screw when a plasticating extruder melts solid pellets or flakes into molten fluid. This software is advanced one based on Chun model, and can be used for designing, process analysis, scale-up etc. Chung model is a unique melting model of an extruder that was developed based on experimental results by a simulative apparatus called "screw simulator" and theoretical studies on them. Chung model usually delivers more realistic result than Tadmor mode. The technical explanation of the software, i.e. theory, program etc., of this software is given in the article [10]. [10] Shirai, T., "Computer Simulation of Plasticating Extruder by Chung Model" (in Japanese), Japan Plastics (July extra issue), P.156 (2005)	Shareware

13	Vent Extruder http://www.vector.co.jp/soft/winnt/business/se333624.html This software is used for calculating optimum channel height of a vent extruder screw. It is based on the theory published by Rauwendaal [11]. The vent extruder has two-sage screw, and this software calculates optimum channel heights of the screw on the condition of isothermal non-Newtonian flow. It is simple but useful for designing, process improvement etc. [11] Rauwendaal, C. J., SPE ANTEC, P.186, (1983)	Shareware
14	Flow between Screw Flight and Barrel http://www.vector.co.jp/soft/winnt/business/se337085.html This software is used for calculating the leakage flow between screw flight and barrel of an extruder precisely. It is based on the theory published by Winter [12]. Theoretical equations are drawn on the assumption of non-isothermal non-Newtonian flow. This analysis is applied to find the cause of polymer degradation by the intensive shear in the clearance, or the cause of screw sticking by the high pressure grown there. [12] Winter, H. H., Polym. Eng. Sci., 20 (6), 406 (1980)	Shareware
15	Fluted Mixing Element of Extruder Screw http://www.vector.co.jp/soft/winnt/business/se336548.html This software calculates the temperature rise, pressure drop etc. at the fluted mixing (also called barrier mixing or Maddock mixing) unit of an extruder. This type of mixing unit has come to be frequently used for improving the uniformity of molten polymer. It is based on the theory published by Tadmor and Klein [13]. When deriving theoretical equations, assumption of Newtonian fluid is adopted, but as different viscosities for the flute channel and for the clearance are used, reliable calculation results can be expected. [13] Tadmor, Z. and Klein, I., Polym. Eng. Sci., 13 (5), 382 (1973)	Shareware
16	Scale-up Rules of Extruder http://www.vector.co.jp/soft/winnt/business/se333620.html This software is used for estimating dimensions and performances of a large extruder from the data of a small extruder, by miscellaneous scale-up rules. Calculation is simple, but convenient and easy-to-use for guessing approximate answer. The details of the scale-up rules used in this software are given in the article [14], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [14] Shirai, T., "Simulation Analysis for Polymer Processing by PC (11)" (in Japanese), Japan Plastics, Vol.50, No.10, P.105 (1999)	Shareware

17	Screen Filter http://www.vector.co.jp/soft/winnt/business/se331871.html This software calculates the pressure drop when non-Newtonian fluid flows through screen filters. For the purpose of filtration and gel dispersion, screen filters are frequently used in polymer processing. Screen filters for these purposes are mostly combinations of multiple different mesh screens. The software is simple and easy-to-use. Details of the theory and a calculation example are given in the article [15], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [15] Shirai, T., "Simulation Analysis for Polymer Processing by PC (7) (in Japanese), Japan Plastics, Vol.50, No.5, P.96 (1999)"	Shareware
18	Flow in Spiral Die http://www.vector.co.jp/soft/winnt/business/se335069.html This software simulates the flow in a spiral die, e.g. flow distribution at the die exit and pressure drop. The theory of this software is developed based on isothermal non-Newtonian fluid. The calculation is not necessarily high-level but troublesome, and is convenient for users interested in the die. The technical explanation of the software, i.e. theory, program etc., is given in the articles [16], [17] which were published as articles of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [16] Shirai, T., "Simulation Analysis for Polymer Processing by PC (7)" (in Japanese), Japan Plastics, Vol.50, No.5, P.96 (1999) [17] Shirai, T., "Simulation Analysis for Polymer Processing by PC (8)" (in Japanese), Japan Plastics, Vol.50, No.6, P.120 (1999)	Shareware
19	Flow in Sheeting Die http://www.vector.co.jp/soft/winnt/business/se392388.html This software simulates the flow in a sheeting die (T die or coat hanger die), e.g. flow distribution at the die exit and pressure drop. One can get information for die design, remodeling and adjustment for getting films with uniform thickness. The theory of this software is developed based on isothermal non-Newtonian fluid. Details of the theory and calculation examples are given in the article [18], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [18] Shirai, T., "Simulation Analysis for Polymer Processing by PC (2)" (in Japanese), Japan Plastics, Vol.49, No.12, P.86 (1998)	Shareware

20	Film Casting http://www.vector.co.jp/soft/winnt/business/se331238.html This software simulates the casting process where molten polymer is extruded from a sheeting die and solidified into flat films or sheets. It is high-level software and simulates changes of temperature, velocity, thickness and tension at the same time. The software is useful for designing, process analysis, scale-up etc. The technical explanation of the software, i.e. theory, program etc., is given in the article [19], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [19] Shirai, T., "Simulation Analysis for Polymer Processing by PC (11)" (in Japanese), Japan Plastics, Vol.50, No.10, P.105 (1999)	Shareware
21	Film Blowing http://www.vector.co.jp/soft/winnt/business/se331773.html This software simulates the film blowing process used for producing films from miscellaneous polymers. It can simulate changes of temperature, velocity, bubble diameter and film thickness at the same time during inflation, and is usable for designing, process analysis, scale-up etc. The technical explanation of the software, i.e. theory, program etc., is given in the articles [20], [21] which were published as articles of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [20] Shirai, T., "Simulation Analysis for Polymer Processing by PC (8)" (in Japanese), Japan Plastics, Vol.50, No.6, P.120 (1999) [21] Shirai, T., "imulation Analysis for Polymer Processing by PC (9)" (in Japanese), Japan Plastics, Vol.50, No.7, P.86 (1999)	Shareware
22	Calendering http://www.vector.co.jp/soft/winnt/business/se332409.html This software calculates the fluctuations of film thickness with time for each cause of them. The theory is the most fundamental one that assumes the fluid is Newtonian, laminar, isothermal and incompressible. The calculation is not necessarily high-level but troublesome, and is convenient for users interested in calendering process. The technical explanation of the software, i.e. theory, program etc., is given in the article [22], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [22] Shirai, T., "imulation Analysis for Polymer Processing by PC (9)" (in Japanese)Japan Plastics, Vol.50, No.7, P.86 (1999)]	Shareware

23	Coater Dryer http://www.vector.co.jp/soft/winnt/business/se366354.html This software simulates the drying process of a coater dryer, where coated layer of polymer/solvent solution is dried and solidified. It is high-level software that considers mass transfer and heat transfer simultaneously, and is useful for designing, process analysis, scale-up etc. The theory and model are the original developments by Shirai. The technical explanation of the software, i.e. theory, program etc., is given in the article [23], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [23] Shirai, T., "Simulation Analysis for Polymer Processing by PC (10)" (in Japanese), Japan Plastics, Vol.50, No.8, P.95 (1999)	Shareware

31	Melt Spinning of PP http://www.vector.co.jp/soft/winnt/business/se329676.html This software simulates the melt spinning process where molten PP is extruded through fine holes into cooling gas, and the polymer is solidified as filaments. It is high-level software that simulates temperature and tension changes, and the thinning process of filament at the same time, and useful for designing, process analysis etc. The technical explanation of the software, i.e. theory, program etc., is given in the article [26], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [26] Shirai, T., "Simulation Analysis for Polymer Processing by PC (11)" (in Japanese), Japan Plastics, Vol.50, No.8, P.95 (1999)	Shareware
32	Melt Spinning of PET http://www.vector.co.jp/soft/winnt/business/se453478.html This software simulates the melt spinning process where molten PET is extruded through fine holes into cooling gas, and the polymer is solidified as filaments. It is high-level software that simulates temperature and tension changes, and the thinning process of filament at the same time, and useful for designing, process analysis etc. The technical explanation of the software, i.e. theory, program etc., is given in the article [26], which was published as one of the series "Simulation Analysis for Polymer Processing by PC" from 1998 to 1999. [26] Shirai, T., "Simulation Analysis for Polymer Processing by PC (11)" (in Japanese), Japan Plastics, Vol.50, No.8, P.95 (1999)	Shareware
33	Dry Spinning http://www.vector.co.jp/soft/winnt/business/se387581.html This software simulates the dry spinning process where polymer/solvent solution is extruded through fine holes into hot gas, and the filaments are solidified by evaporating the solvent. It is high-level simulation software that considers mass balance, energy balance and momentum balance at the same time, and useful for designing, process analysis etc. The technical explanation of the software, i.e. theory, program etc., is given in the article [27] [27] Shirai, T., "Computer Simulation of Dry Spinning" (in Japanese), Japan Plastics, Vol.57, No.2, P. 87 (2006)	Shareware