Detailed Description

WORM (Write One, Run Many) was developed to simplify and streamline the creation of MCNP input decks for nuclear criticality safety analyses. However, WORM is actually usable for any computer code that uses an ASCII text file for input. WORM is completely written in Perl, the Practical Extraction and Reporting Language. Perl is one of the most portable programming languages available today. As such, the WORM works on practically any computer platform.

A WORM model is essentially a standard input deck with some of its numerical values replaced by WORM code. Within the model, the WORM code is identified with opening and closing angle brackets (< and >). WORM parses the model file. Text that is outside the angle brackets is echoed verbatim. Code that is inside the angle brackets is evaluated and the result inserted in the model at the location of the code.

The main advantage of the WORM code is the list shorthand expressions which expedite parametric studies. A parametric study requiring multiple input files, say for MCNP, can be generated from a single user-written WORM model. For example, if the objective of the parametric study were to determine the effect of increasing an input value from one to ten with a resolution of one-half, the WORM model could represent that input value with the list `<t=1:10:0.5>`. List values can also be generated by linear or logarithmic interpolation between two points. If multiple lists are used in the model, WORM steps through each list individually, i.e., WORM creates input decks corresponding to each and every permutation of the list values.

Within a WORM model, code can also be used to perform mathematical calculations. WORM code may include and evaluate the following mathematical operators and functions: addition, subtraction, multiplication, division, exponentiation, modulus, sine, cosine, tangent, arcsine, arccosine, arctangent, the natural logarithm, logarithm base 10, integer truncation, absolute value, and random number. Several common constants, e.g., pi, e, and Avogadro's Number (both as 6.022e23 and 0.6022), are predefined in WORM. This is useful for setting parameters that are dependent on a list. For example, if the mass of a spherical unit is varied, the corresponding radius could be calculated by the WORM code `<radius = ((3*mass)/(4*pi*density))^(1/3)>` where `density` is defined by another WORM code statement in the model.

Additionally, many unit conversion factors are also predefined: millimeters, meters, inches, feet, yards, and mils to centimeters; kilograms, pounds, and ounces to grams; liters, milliliters, gallons, and fluid ounces to cubic centimeters; and angular degrees to radians.

The user may also create their own Perl subroutine in the WORM model file. The subroutine can then be invoked by WORM code.

Additionally, a library of standard material definitions and Perl subroutines are included. Any one of these files can be incorporated into the subject model with a simple WORM read command. The WORM code `<read <i>filename</i>>` places the contents of the referenced file into the WORM model before it is evaluated by WORM. The material definitions provided are:

air	alumina	aluminum
azelaic_acid	b4c	beryllium
beryllium_oxide	bisco_NS4	bisco_NS4FR
bisco_NS4FR_B4C	bismuth	borax
bpa	bromobenzene	cadmium
carbon_steel	celotex	cerafiber

compB3	compC4	concrete_CMRR
concrete_LANL	concrete_PF4	copper
dapsone	ddsa	dicyandiamide
diethylenetriamine	du	duoseal
epichlorohydrin	ethanol	ethylenediamine
ethylene_glycol	fc43	foray
glass_lead	glass_plate	granite
graphite	gypsum	haynes214
hdpe	hfe7100	hfe71ipa
hfe7200	hfe72da	hfe72de
hfe7500	inconel	iron
isophorone_diamine	kaolinite	kynar
ldpe	lead	lead_oxide
lucite	magnesium_oxide	meehanite
metlx	mineral_oil	mockhe
mockhe_90024	mockhe_90503	mockhe_90505
molybdenum	mphenylenediamine	nickel
nitroglycerin	pbx_9404	pbx_9407
pbx_9501	pbx_9502	peha
pewter	pf5050	phthalic_anhydride
polybiz	polystyrene	president
pu238_239	pu238_239_water	pu239
pu239_240	pu239_240_oxide	pu239_240_oxide_water
pu239_240_water	pu239_h2	pu239_h3
pu239_oxide	pu239_oxide_aries	pu239_oxide_aries_water
pu239_oxide_water	pu239_water	pvc
pyrex	pyrex_b11	r134a
rdx	sand	sebacic_acid
silica_amorphous	silicon_dioxide	sodium_bicarbonate
sodium_chloride	ss304	ss316
stearic_acid	succinic_anhydride	tantalum
tatb	tce	teta
tetrahydrophthalic_anhydride	thorium	titanium
tmbac	tnt	torr_seal
trimellitic_anhydride	tungsten	tungsten_carbide
u235	u235_238	u235_238_oxide
u235_238_water	u235_oxide	u235_oxide_water
u235_water	u3o8	u3o8_enrichment
urethane	uxmo	u_hydride
u_natural	vaf	vermiculite
vermiculite_crude	water	zeolite
zircaloy_2	zircaloy_4	zirconium

The PERL subroutines included are:

fct_lattice_parameter	fct_maxfct	fct_minfct
fct_number_string		