



UR Add-on pack



KURC / Add-on pack



KURC – KAPPA Unconventional Resources Consortium:

- KURC-1: 2012 2015
- KURC-2: 2016 2020

UR Add-on pack:

- All former KURC-1/2 features + new developments
- Specific license privilege in Saphir ♥, Topaze ♥ and Rubis ♥
- Non-digressive, per stand-alone license pricing
- Available since KW v5.20.01 (2018)

Latest update KW v5.40.05 (Dec 2021)



Add-on pack: Analytical



- DFN analytical model with conjugate fractures
- Anomalous diffusion model
- Multi-zone fractional model
 - Dynamic Drainage Area corrected Linear Flow plot
 - Flowing Material Balance plot
 - Statistical EUR

Add-on pack: Numerical



- Fast numerical models for SRVB & Trilinear geometries
 - Water flowback with static Initialization
- Womerical DFN model
- Vertical model with composite zones
- Load and display of microseismic data
- Simulation of Klinkenberg effect
- Fickian diffusion
- Performed a MFHW
- ♥♥♥ DFN Upscaling
- Loading properties of fracs



Add-on pack: new features



- v5.30.03: ♥♥♥ Load from Fracturing Software
 - Confined PVT
 - ♥♥♥ Multiple KrPc
 - Stochastic DFN realizations
 - ♥♥♥ Interference with DFN: Fast Marching Method
 - Stimulated zones around the fractures
 - Numerical 'butterfly' model
- v5.40.01: ♥♥♥ CSG Well Intake
- v5.40.02: ♥♥♥ Fractal MFHW
 - Fractional Dimension Workflow
 - Cumulative Volume Loglog Plot



DFN analytical model



• Conjugate fractures: # fissures and geometry

		? X	Complex horizontal fractured well	2
Parameters				
Show: All	Show shore	t names 🔌		
Well & wellbore		<u>^</u>		
Skin	0.00000			
Modeling type	Conjugate fractures	•		
Flow type	Simple			
Well length	SRVB			
Zw	Complex			
Global fracture parameters	Conjugate fractures	N		
Number of fractures	12	10		
Fracture model	Infinite conductivity			
Fracture half length	806.657	ft		
Fracture height	30.0000	ft		
Fracture width	0.00328084	ft		
Global natural fissure parameters		~		
Fissures connected				
Vertical half number of fissures	1			
Fissure half length	80.0000	ft		
Fissure height	30.0000	ft		
Fissure model	Infinite conductivity	0		
History constraints		^		
Include constraints	\checkmark			
Max surface rate constraint	3.00000E+5	Mscf/D		
Min surface rate constraint	0.00000	Mscf/D		
Reservoir & boundary		A T		
	Genera	te Cancel		



Anomalous Diffusion



Available under 'Specific' analytical models

Generate analytical model				(?)
Standard models Specific models					
Main options:	~	Parameters			
Impose pi		Show: All	Show short names		
Wellbore model [Constant]	\sim	Modeling type	Trilinear		-
Proxy model [Fractured horizontal with anomalous diffusion]	^	Flow type	Simple が Trilinear		
Fractured horizontal with anomalous diffusion 💌		Zw	100.000	ft	•
		Number of fractures	312		
		Fracture half length	47.8253	ft	•
Boundary model [Infinite]	~	Fracture model	Finite conductivity		•
		Fracture conductivity	500.000	md.ft	•
Infinite •		FcD	1.03479E+6		Ŧ
Show average pressure		Fracture skin	0.00000		~
		Reservoir & boundary			~
Time stepping	\vee	Initial pressure	3858.75	psia	•
		Transmissibility	0.00202066	md.ft	•
		Permeability	1.01033E-5	md	•
		Thickness	200.000	ft	•
		Porosity	0.096		Ŧ
		Outer permeability	1.61583E-5	md	•
		Outer porosity	0.096		-
		Super diffusion			
		Primary diffusion exponent	0.995557		Ŧ
		Secondary diffusion exponent	0.76		· · ·
C Keep dialog open			Generat	e Ca	incel

- Well+boundary:
 - Simple MFHW + infinite/rectangle
 - Trilinear + infinite/closed reservoir
- Matrix: single/double porosity
- Single layer models only
- Can include changing WBS, rate-/time-dependent skin

Additional parameters: α_f and α_m (also for outer zone in Trilinear)

Fractured-Well Performance Under Anomalous Diffusion, Raghavan and Chen, SPE-165584 (2013). Also SPE-191407, SPE-191484.

Multi-zone fractional dimension

Available under 'Specific' analytical models

Generate analytical model				?	x
Standard models Specific models					
Main options:	~	Parameters			
Impose pi		Show: All	Show short names 🙀		
Wellbore model [Constant]	\sim	Well & wellbore			^
		Wellbore storage	0.00167181	bbl/psi	•
Proxy model [Multi-zone fractional dimension]	^	Skin	0.00000		~
Multi-zone fractional dimension 🔹		Total fracture half-length	4500.00	ft	•
		Reservoir & boundary			^
		Initial pressure	3858.75	psia	•
Boundary model [Infinite]	~	Transmissibility	0.00202066	md.ft	•
		Permeability	1.01033E-5	md	-
Infinite 🔻		Thickness	200.000	ft	•
Show average pressure		Porosity	0.096		~
		Number of zones	2		
Time stepping	\vee	Minimal distance	1.00000E-6	ft	•
		Total compressibility	1.96297E-5	psi-1	•
		Zone#1			^
		Fractional dimension	0.3		~
		Outer radius	300.000	ft	•
		Interface area control type	Consistent volume (behind)		-
		Zone#2			~
		Fractional dimension	0.7		~
🗌 Keep dialog open			Generate	Cancel	I

Boundary: infinite / circular / linear

ΚΑΡΡΑ

- Compatible with multilayer geometry
- Compatible with timedependent skin
- Not available with timedependent well mode

Also SPE-2667752, SPE-2896802, SPE-2876208.

Analytical Pressure and Rate Transient Models for Analysis of Complex Fracture Networks in Tight Reservoirs, J.A. Acuña, SPE-2429710 (2016).

Clarkson DDA Linear Flow plot

KAPPA

? / L =

Linear flow analysis modified using pseudo-p from Dynamic Drainage Area concept

Time interv

Global results

Production logs Sensitivity

Normalized rate

Linear flow

Fetkovich

Other wells

selection

Multiphase extraction

New plot

3D

DCA



Rate-transient analysis of liquid-rich tight/shale reservoirs using the dynamic drainage area concept: Examples from North American Reservoirs, Qanbari and Clarkson, Journal of Natural Gas Science and Engineering 35 (2016)

Clarkson linear flow plo

Multiphase/multiwell FMB Plot 💙

 q_o

 Δp_{pw}

KAPPA

4.5

 $\Delta p_{pav} N$

bN

General Flowing Material Balance equation modified using pseudo-pand p_{av} from MB calculations

Multiphase extraction except: Dry gas + Water, Wet gas + Water, EoS + Water

3D

DCA

Multi-Well, Multi-Phase flowing Material Balance Shahamat and Clarkson, SPE 185052 (2017)

Statistical EUR

- → Single forecast
- → Monte Carlo + Improve for uncertainty estimate
- Monte Carlo + Model Mining: replacing the CPU expensive nonlinear regression step by a data mining proxy

Model Mining is activated when:

- Model forecast in done
- There are multiple Monte Carlo sensitivity runs on the forecast
- The sensitivity runs 'bracket' historical *Q*_{cum}

Water flowback

To model the post fracture treatment water flowback:

- The user inputs the total injected water volume
- The injected volume is divided between the connected hydraulic and natural fractures (accounts for Kr end points)
- The local pressure increase is not modeled

Available in the numerical model:

- Multiphase PVT includes water
- Real PVT are used
- Well is set to MFHW

Well 1		
Modeling type	Simple	
Drain angle	0.00000	۰
Fracture model	Infinite conductivity	
Number of fractures	15	
Fracture half length	300.000	ft
Fracture height	30.0000	ft
Fracture mid-point height	15.0000	ft
Width	0.00328084	ft
Fracture angle	90.0000	۰
Zw	15.0000	ft
Well length	1000.00	ft
Stimulated zones around fractures	[
Include injected water		\checkmark
Injected water	5000.00	MMSTB
Rate dependent skin		

Klinkenberg effect

For gas observed permeability can be higher than the true/absolute permeability of the rock due to slippage

Available in the numerical model:

- PVT is set to dry gas
- Real PVT are used
- Reservoir type: homogeneous

Well 1		^
Zw	15.0000	ft
Perforation length	30.0000	ft
Well length	30.0000	ft
Rate dependent skin		
Skin	0.00000	
Wellbore model	None	
Bottomhole MD	6000.00	ft
Include constraints		
Reservoir		^
Initial pressure	7246.55	psia
Reservoir type	Homogeneous	
Transmissibility	1000.000	md.ft
Permeability	33.3333	md
Thickness	30.0000	ft
Porosity	0.1	
Klinkenberg		\checkmark
Klinkenberg b	200.000	psia
Net-to-gross	1.00000	
kz/kr	1.00000	

Confined PVT

The size of the pores ~ the size of hydrocarbon molecules ('confined') \rightarrow PVT is different from the phase behavior in a laboratory cell

			ΚΑΡΡΑ ΡΥΤ		Rubis license	required
		1 🗋 🔥 健	C PVT & diffusion			× ?
Dt I	Flash KAPPA ASCII Ex	cel Clipboard Petex IFP Ec	PVT & diffusion Analytical	modeling Numerical modeling		
	Quick flash	Import	Problem definition			
d')	📥 Main 🛛 🔨	Equations of State	Common functionalities		YRubis license required	
.,	Fluid system	Fluid type	Non uniform parar	neters	Load horizons	
e	Equations of State (EQS) ×	-	Vertical anisotropy	/	Load from geomodeler	
•		Oil / Gas	Horizontal anisotro	рру	Property sets	
		Wet gas			Improve on multiple wells	
		O Dead oil			Faults with throws	
		O Saturated oil (bubble point	flu			
		O Condensate (dew point flu	id) Nonlinear diffusion			
		Define from lab report	Common functionalities		V Rubis license required	
			Use real PVT		Temperature modeling	
		Equation of State	Non Darcy flow		Gravity	
		Water 😽	Unconsolidation		Contined PVT	
			Allow aquiters			
Eluid D	ofinition T	no EoS	Reservoir	500	0.00	ngia
		/pe. L00	Variable type	Cor	mosition	psia
Chook	Confined	ידע רם	Reservoir type	Hor	nogeneous	
Check	Commed		Transmissibility	0.0	184281	md.ft ancel
(10 A A	and the second	Permeability	6.1	.4271E-4	md
Pore ra	adius' is av	allable in	Thickness	30.	0000	ft
			Porosity	0.1		
Keserv	or Propert	les	Net-to-gross	1.0	0000	
	•		kz/kr	1.0	0000	
			Pore radius	1.0	00000E-8	m

Fickian diffusion

PVT includes gas & Real PVT are used

Available under 'Reservoir type'

Generate numerical model					? X
Main options	~	Parameters			
🗌 Indude other wells 🛞	Reset from diagnostic		Wellbore sto	orage calcula	tor 🔡
Show average pressure	Reset from analytical	Show: All	Show short names		
Output	^	Perforation length	250.000	ft	v A
Output regult fields	A	Well length	250.000	ft	-
	Automatic	Rate dependent skin			
Output wall drain and road to (Pubia anh.)) Manual 2005	Skin	0.00000		
Uutput weil drainage results (Rubis only)		Wellbore model	Constant		-
Advanced	~	Wellbore storage	9.50978E-4	bbl/psi	-
		Bottomhole MD	6000.00	ft	-
Time stepping	~	Include constraints			
Numerical settings	~	Reservoir			^
		Initial pressure	4228.00	psia	-
		Reservoir type	Fickian diffusion		-
		Transmissibility	Homogeneous		- 111
		Permeability	Dual porosity pseudo steady	state	-111
		Thickness	230.000 00	14	
		Porosity	0.2		-
		Net-to-gross	1.00000		-
		Diffusion time	10.0000	hr	-
		Diffusion ratio	1.00000		-
		kz/kr	1.00000		· · ·
Кеер	dialog open		Generate	Can	cel

or 'Reservoir properties'

Reservoir properties				?
Topology		Property set definition		
		Name: Default		
Uniform Layered Regional	Complex	Show: All	Show short names	7
Click to edit, right-click to assign				
Default		Reservoir type	Fickian diffusion	
Layer #1 Default		Permeability	Homogeneous	
		Porosity	Dual porosity pseudo stead	dv state
		Net-to-gross	Fickian diffusion	
		Diffusion time	10.0000	hr
		Diffusion ratio	1.00000	
		kz/kr	1.00000	
		Lower layer leakage	1.00000	
		Rock compressibility	3.00000E-6	psi-1
Redefine KrPc in hydraulic fractures	X	KrPc: Default	- X	Û
Apply unconsolidation in hydraulic fractures	İ	Initial state: Default		Û
Use DFN		Pressure dependent properties: Default		Û
	\mathbb{I}	Desorption: Default		Û
	Geothermal gradient			
			OK	Cancel

Numerical DFN

DFN and well fractures have distinct properties, including relative permeabilities and k(p).

Numerical Proxy models

Useful in the case of complex PVT and a simple very long MFHW to tune the fracture properties prior to running the full numerical model

Generate numerical model				7) x
Full (3D) Proxy (1D)					
Main options	^	Parameters			
Generate p(q) Reset from diagnostic					
Generate q(p) Reset from analytical		Show: All 🔻 🖓	Show short names 👔	1	
Show average pressure				5	
Fast model with approximation: 5 %		Reference Well			^
Strictly honor null rate period		Number of fractures	15		
10.0000	- 1	Fracture half length	325.943	ft	•
	- 1	Well length	4000.00	ft	•
		Stimulated zones around fractures			
Proxy model	^	Wellbore model	None		-
Fractured horizontal as SRVB		Include constraints	\checkmark		
Fractured horizontal as SRVB	- 1	Max surface rate constraint (Producer)	4000.00	STB/D	-
A Fractured horizontal as trilinear	~	Min surface rate constraint (Injector)	0.00000	STB/D	-
Butterfly		Reservoir			~
Time stepping	~	Initial pressure	9000.00	psia	•
Numerical settings	~	Variable type	Bubble point pressure		-
		Init. bubble point	8280.90	psia	•
		Transmissibility	0.2	md ft	•

Efficient Proxies for Numerical Simulation of Unconventional Resources, Artus et al., 1896873-MS URTEC Conference Paper (2014)

Composite zones

Composite limits are now allowed to cross fractures to simulate enhanced area close to the well

Region #1			^
Reservoir type	Homogeneous		•
М	1.00000		Ŧ
D	1.00000		$\overline{\nabla}$
Net-to-gross	1.00000		$\overline{\tau}$
Region #2			^
Reservoir type	Homogeneous		•
М	Homogeneous	N	
D	Dual porosity pseudo steady state	ЬS	
Net-to-gross	1.00000		Ŧ

DFN Upscaling

DFN upscaling reduces the refinement of the grid (and gridblock count), correctly accounting for the matrix-to-fracture flow and interaction

- DFN added in Map X
- Upscaling parameters are available in Grid

DFN upscaling	\checkmark	
DFN resolution	4.00000	ft
DFN coarse resolution	50.0000	ft

Min gridblock size changes from 'DFN resolution' to 'DFN coarse resolution'

Stochastic DFN realizations ****

'Map' \rightarrow 'DFN' \rightarrow 'Generate'

Location can be defined μ -seismic, if loaded

Global settings						
Fissures parameters						~
Number of fissures			50			
Use microseismics events						
X minimum			-2500.00	D		ft
X maximum			2500.00	0		ft
Y minimum			-1500.00	D		ft
Y maximum			1500.00			ft
Impose random generator se	ed					
Fissure families Family parameters			^		Family name	Add
Fissure families Family parameters Fraction	0.5	Fracti	^ on	•	Family name Family 1	Add
Fissure families Family parameters Fraction Minimum fissure length	0.5	Fracti	on	Þ	Family name Family 1 Family 2	Add Delete
Fissure families Family parameters Fraction Minimum fissure length Maximum fissure length	0.5 200.000 300.000	Fracti ft ft	on	ŀ	Family name Family 1 Family 2	Add Delete
Fissure families Family parameters Fraction Minimum fissure length Maximum fissure length Power	0.5 200.000 300.000 1.50000	Fracti ft ft	on	Þ	Family name Family 1 Family 2	Add Delete
Fissure families Family parameters Fraction Minimum fissure length Maximum fissure length Power Strike angle	0.5 200.000 300.000 1.50000 30.0000	Fracti ft ft	on	ŀ	Family name Family 1 Family 2	Add Delete

Interference with DFN: FMM **W**

At least 2 wells must exist in the map

'Map' \rightarrow 'DFN' \rightarrow 'Generate'

Interference time is an input to constrain the DFN

A number of realizations are run using Fast Marching (flow in fractures only) to pick one closest to the interference time

Then a full model is run in

ζαρρδ

Accelerated initialization

Large models with multiple MFHWs are initialized using specific faster procedures

Loading properties of fracs

The option allows loading individual fracture properties for a complex MFHW from a file

- MFHW well modeling type should be set as 'Complex'
- 'Load' button is available in the well dialog
- Tick the options prior to loading a file:
 - Half-length
 - Fracture position (MD)
 - Angle to the wellbore
 - Individual properties (w, F_{CD} , ϕ)
 - Offset

Geometry and properties - Fracture #4			
Measured depth	7631.17	ft	
Fracture half length	1134.53	ft	
Fracture angle	67.8886	۰	
Fracture offset	192.914	ft	
Fracture height	400.000	ft	
Fracture conductivity	150.000	md.ft	
Fracture width	0.01	ft	
Fracture porosity	0.1		

oad from	file						? X
Data Sour	ce			Separat	tors		
C:\Users\k	ostyleva\Desktop\F	ractures definition	- Nc •••	☑ Spa ☑ Tab Others:	ice ;		
Column	Column 1	Column 2	Colu	mn 3	Column 4	Column 5	
Туре	Fracture name	MD Start	Xf		Angle	Offset	•
Unit		ft	ft		•	UnDefined	
1	Fracture name	MD	Xf		Angle	Fracture na Xf	ime
2			[ft]		[degrees]	MD Start	
3	Fracture #1	6000	462.	151	67.1651	Angle	
4	Fracture #2	6361.64	550.	908	67.5127	Width v	
5	Fracture #3	7060.38	300		63.117	-6.92786	
6	Fracture #4	7631.17	1134	1.53	67.8886	192.914	
7	Fracture #5	8822.01	635.	809	48.9681	250.219	
8	Fracture #6	9350.3	300		53.0675	-42.3358	
9	Fracture #7	9920.6	630.	716	51.8192	-209.228	
10	Fracture #8	11110.2	559.	728	58.7486	-311.902	
11	Fracture #9	11576.7	667.	894	58.7188	-166.042	
12	Fracture #10	12235	300		69.9204	-83.1065	

_oad from fracturing software 💔 🏑

Fracture properties can be non-uniform along the fracture plane

	Settings	
	Name:	Field H Well 25
	Unique Well ID:	
	Well type:	Horizontal fractured 🔹
	Radial composite	🗌 Multiple fractures 🛛 🗲
	Time dependent	Inflow control devices
	Geometry and properties	^ _
	Modeling type	Complex
	Drill floor elevation	0.00000 ft

	Radial composite	Multiple fractu	res 🗲	
	Time dependent	Inflow control	devices	
	Geometry and properties		^	*
E	Modeling type	Complex		
	Drill floor elevation	0.00000	ft	
	Well radius	0.3	ft	
	Drain angle	0.00000	•	
	Well length	2000.00	ft	
	Zw	15.0000	ft	U
	Import fracture data			
	Stimulated zones around fract] V3	
	Rate dependent skin]	
	Location		^	
	Input well head]	
	X	-1000.00	ft	
	Y	0.00000	ft.	Ŧ

- Define a MFHW as 'Complex'
- Activate 'Import fracture data'
- Load properties from *.csv or *.xml:
 - Index, TVD and location at the well

ΔΡΡΔ

- (X,Z): w_f , k_f , F_{CD} , φ , β
- Define fracture MD and angles

Microseismics

Load and display of microseismic events to constrain the MFHW configuration

Visualizing attributes: date, amplitude, stage index

Stimulated zones

Stimulated zones around fractures of a MFHW

- Available for both Simple and Complex well types
- Defined by radius of the zone, k and φ multipliers

Parameters			
Show: All	Show shore	t names	
Well 1			
Modeling type	Simple		
Drain angle	0.00000	۰	
Fracture model	Infinite conductivity		
Number of fractures	13		
Fracture half length	360.000	ft	
Fracture height	30.0000	ft	
Fracture mid-point height	15.0000	ft	
Width	0.00328084	ft	
Fracture angle	90.0000	۰	
Zw	15.0000	ft	
Well length	2000.00	ft	
Stimulated zones around fractures			
Stimulation radius	50.0000 h	ft	
Permeability multiplier	4.00000		
Porosity multiplier	1.00000		
Rate dependent skin			
Wellbore model	None		
Bottomhole MD	6000.00	ft	

These parameters can be regressed upon in 'Improve'

nprove	
Parameters	Targets
Constant p	arameters
- V	Vell 1
	Theta
	Ν
	Xf
	Hf
	Zf
	Width
	Beta
	Zw
	Lw
•	Stimulation radius
	k multiplier
•	phi multiplier
	Parameters Constant p

Compatible with numerical SRVB/Trilinear models

Refrac

The option allows opening some MFHW fractures at a later time

- Well is set as a MFHW
- Fractures are Finite conductivity
- (a) **Regular** refrac pattern:

Refrac		\checkmark	
Refrac elapsed time	18.0000	Month 🛛 🔻	→ T
Number of fractures at t0	12		→ <i>a</i> _
Refrac ratio	4		> b
Infil			

(b) **Irregular** refrac pattern:

- Complex MFHW + indiv.properties
- Each fracture has its own refrac time T

Before refrac (time = 0): After refrac (time = T): $N_f = a$ $N_f = a + b (a - 1)$

(c) **Infill** option:

• All fractures start with matrix properties and switch to high conductivity at refrac elapsed time T

Multiple KrPc

Natural fissures

Matrix, well fractures and natural fissures can have independent sets of KrPc

Multiphase PVT is defined & real PVT are used

**		R	\checkmark	
		Natural fissures	DF	Load Generate Delete Export
		DFN ? X		Redefine KrPc in natural fissures
PVT and	Generate numerical model			
Diffusion Matrix	Main options ^		Properties	Apply unconsolidation in natural fissures
PVT & diffusion	Include other wells	Load Generate Delete Export		
PVT & diffusion Analytical modeling Namerical modeling	Reset from analytical		Reservoir properties	
PVT	Show average pressure		Topology	Property set definition
	Output ^			Name: Default
Single phase Reference fluid: Gim	Output result fields Output result fields	Apply unconsolidation in natural fissures	Uniform Layered Regional Complex	Show: All V V Show short names 🙀 V
	Output well drainage results (Rubis only)		Click to edit, right-dick to assign	
Define advanced PVT:	Advanced	Parameters	Default	Reservoir type Homogeneous 👻 🖵
Diffusion	Advanced .	General ^ *	Layer #1 Default	Permeability Constant • 33.3333 md •
Diffusion	Time dependent 🕔	Origin Generated		Porosity Constant V 0.1
Relative permeability:	Use well intake	Number of fissures 150		kz/kr 1.00000
	Redefine KPC in bydraulic fractures	Total Xf 14460.8 ft 🔻		Lower layer leakage 1.00000
🗌 Unconsolidation:		Average Xf 96.4051 ft 🔻		Rock compressibility 3.00000E-6 psi=1 - ancel
	Apply unconsolidation in hydraulic fractures	Global fissures physical parameters	Well fractures	Matrix
Desorption:		Model type Finite conductivity	Well Haddies	
	Use DFN	Porosity 0.1 v	Redefine KrPc in hydraulic fractures	KrPc: Default
	Time stenning v	Width 0.00328084 ft •		
		Conductivity 10.00000 md.ft •	Apply unconsolidation in hydraulic fractures	Initial state: Default
	Numerical settings V			Pressure dependent properties: Default
		Cancel		
	Keep dialog open			Desorption: Default
		16	Geothermal	
	OK Cancel		groutri	
				OK Cancel
				11.

Numerical 'butterfly' model

The butterfly model is the numerical counterpart of the multi-zone fractional dimension (MZFD) analytical model. The model solves on a 1D simplified geometry, but benefits from accounting for the non-linearities.

- Constant thickness geometry
- The width of the area perpendicular to the flux varies with a power-law relationship
- Wellbore: constant / changing
- Boundary: infinite / circular / linear

ΚΑΡΡΑ

CSG Well Intake

Available when:

- PVT is defined as 'Dry gas + Water'
- Annular well intake

Assumptions:

- Steady-state flow
- Water level is an input

Fractal MFHW

A 💼

MZFD model parameters are used to generate a fractal MFHW with an equivalent response Fractional Dimension Workflow

Transferrable results O All results

Prectoral dimension degrast

Zone #1

New in v5.40.02

KAPPA

Integrated MZFD model workflow: parameters read from diagnostic lines on the loglog plot used to initialize the model

Cumulative Volume Loglog Plot 🧡 🏑

New in v5.40.02

KAPPA

An additional diagnostic plot for the 'butterfly' model behavior:

THANK YOU

