Table 1 Periods and amplitude variations of all IMF components

Series	IMF	Period/a	Minimum amplitude ($10^8m^3/10^4t$)	Maximum amplitude ($10^8m^3/10^4t$)	Average amplitude ($10^8m^3/10^4t$)
Runoff	IMF1	4	0.887	77.493	29.036
	IMF2	8	0.442	54.525	21.131
	IMF3	14	0.413	18.89	8.617
	IMF4	35	0.068	23.439	14.615
Sediment discharge	IMF1	4	275.314	4095.527	1247.26
	IMF2	8	32.616	1040.293	351.678
	IMF3	14	2.653	272.609	150.348
	IMF4	40	1.928	352.419	228.491

Table 2 ADF test results for the raw runoff and sediment discharge series

Variable	ADF value	1% critical value	5% critical value	10% critical value	Stability
Y	-0.743655	-2.610192	-1.947248	-1.612797	No
X	-1.545201	-2.610192	-1.947248	-1.612797	No
△Y	-10.03566	-2.610192	-1.947248	-1.612797	Yes
△X	-11.92432	-2.610192	-1.947248	1.612797	Yes

Table 3 ADF test results for runoff components (Y_i)

Variable	ADF value	1% critical value	5% critical value	10% critical value	Stability
IMF1	-8.164114	-2.611094	-1.947381	-1.612725	Yes
IMF2	-7.858640	-2.612033	-1.947520	-1.612650	Yes
IMF3	-1.898095	-3.565430	-2.919952	-2.597905	No
ΔIMF3	-3.934694	-2.613010	-1.947665	-1.612573	Yes
IMF4	-3.151498	-4.161144	-3.506374	-3.183002	No
ΔIMF4	-3.053099	-2.613010	-1.947665	-1.612573	Yes
RES	-9.837440	-4.144584	-3.498692	-3.178578	Yes

Table 4 ADF test results for sediment discharge components (X_i)

Variable	ADF value	1% critical value	5% critical value	10% critical value	Stability
IMF1	-9.258189	-2.610192	-1.947248	-1.612797	Yes
IMF2	-6.963950	-2.612033	-1.947520	-1.612650	Yes
IMF3	-1.963513	-4.165756	-3.508508	-3.184230	No
ΔIMF3	-4.323783	-2.615093	-1.947975	-1.612408	Yes
IMF4	-2.931849	-4.161144	-3.506374	-3.183002	No
ΔIMF4	-5.718672	-3.661661	-2.960411	-2.619160	Yes
RES	-7.794551	-4.296729	-3.568379	-3.218382	Yes

Table 5 ADF test results for the residual series of the raw, IMF3, and IMF4 series

Residual	ADF value	1% critical value	5% critical value	10% critical value	Stability

Raw series	-5.220763	-2.609324	-1.947119	-1.612867	Yes
IMF3	-3.579207	-2.644302	-1.952473	-1.610211	Yes
IMF4	-8.812004	-4.296729	-3.568379	-3.218382	Yes

Table 6 Runoff-sediment discharge regression models for the raw series and the series of all the components

Series	Equation	Goodness of fit
Raw series	$Y = 0.056915X + 132.7723$	$R^2 = 0.711045$
IMF1	$Y_1 = 0.0521X_1 - 1.5891$	$R^2 = 0.8105$
IMF2	$Y_2 = 0.0535X_2 - 0.1907$	$R^2 = 0.8357$
IMF3	$Y_3 = 0.038982X_3 + 0.088789$	$R^2 = 0.410943$
IMF4	$Y_4 = 0.03894X_4 + 0.569425$	$R^2 = 0.342336$
RES	$Y_5 = 0.1348X_5 + 29.383$	$R^2 = 0.9975$

Table 7 Variable structure runoff-sediment discharge cointegration models for the IMF3 component

Model	Equation or goodness of fit

Model 1	$Y_3 = -1.788757 + 12.69936 D_{1t} + 0.038771 X_3 + \varepsilon_t$
Model 2	$Y_3 = 6.185330 + 22.31577 D_{1t} - 0.356536 t + 0.041485 X_3 + \varepsilon_t$
Model 3	$Y_3 = 6.30271 + 21.90353 D_{1t} - 0.360292 t + 0.039626 X_3 + 0.024358 D_{1t} X_3 + \varepsilon_t$
Model 1	$R^2 = 0.606516$
Model 2	$R^2 = 0.788878$
Model 3	$R^2 = 0.800332$

Table 8 Variable structure runoff-sediment discharge cointegration models for the IMF4 component

Model	Equation or goodness of fit
Model 1	$Y_4 = -4.292300 + 32.06524 D_{2t} + 0.071439 X_4 + \varepsilon_t$
Model 2	$Y_4 = -0.369124 + 38.44880 D_{2t} - 0.1924306 t + 0.074918 X_4 + \varepsilon_t$
Model 3	$Y_4 = -0.05436 - 91.25096 D_{2t} - 0.208047 t + 0.075784 X_4 - 0.389032 D_{2t} X_4 + \varepsilon_t$
Model 1	$R^2 = 0792911$
Model 2	$R^2 = 0.807911$
Model 3	$R^2 = 0.841282$