Correlation between *h*-index, Eigenfactor™ and Article Influence™ of chemical engineering journals

One correlation that Yin[1] did not explore in his recent study of the correlations between various bibliometric indicators is that between the *h*-index and a possible composite indicator based on Eigenfactor™ and Article Influence™. It is believed now that one can postulate an energy-like term[2], to be called exergy (for 'external' energy), $X = C \times i$, where *C*, the raw (i.e. unweighted) citations, is a measure of the quantum of output, and *i*, the impact (ratio of raw citations to number of publications), is a measure of the quality of the output in any information production process. Then *X* is the best single number scalar performance indicator of the total information production activity of the entity (individual, group or journal). The Eigenfactor™ and Article Influence™ terms are the weighted analogues of citations and impact that emerge from the recursive iterative algorithm used to compute these from the raw citation and publication data (http://www.eigenfactor.org/methods.htm). Therefore, by analogy, one can propose an equivalent weighted performance indicator of the total information production activity of any journal belonging to a pre-determined set of journals, exergy $X^* = \text{Eigenfactor}^{TM} \times \text{Article Influence}^{TM}$.

There is also recent evidence[3] that *X* is correlated with h^3, so that if one defines a composite indicator $p = X^{1/3}$, then *h* will correlate well with *p*. To study this further, the data in table 1 of Yin[1] for broad-based chemical engineering journals were used to compute p^* (now defined as $(X^*)^{1/3}$) and the results are tabulated and presented graphically in Table 1 and Figure 1 respectively. The Pearson's correlation coefficient between p^* and *h* is 0.980677, and this can be visualized to emerge from Figure 1.

Table 1. Computation of $p^* = (\text{Eigenfactor}^{TM} \times \text{Article Influence}^{TM})^{1/3}$ to ascertain the correlation with *h*

Broad-based chemical engineering journals	*h*	*Ef*	*AI*	*X**	*p**
Chem. Eng. J.	36	0.01843	0.765	0.01410	0.24158
AIChE J.	60	0.02687	0.803	0.02158	0.27839
Chem. Eng. Sci.	61	0.04452	0.666	0.02965	0.30951
Ind. Eng. Chem. Res.	69	0.06681	0.607	0.04055	0.34357
Chem. Eng. Technol.	24	0.00744	0.351	0.00261	0.13771
Chem. Eng. Res. Des.	30	0.00606	0.368	0.00223	0.13065
Braz. J. Chem. Eng.	10	0.00133	0.200	0.00027	0.06431
J. Chem. Eng. Jpn.	23	0.00452	0.224	0.00101	0.10041
J. Chin. Inst. Chem. Eng.	9	0.00105	0.135	0.00014	0.05214
Can. J. Chem. Eng.	23	0.00301	0.226	0.00068	0.08795
Chem. Eng. Commun.	17	0.00206	0.175	0.00036	0.07117
Chin. J. Chem. Eng.	10	0.00146	0.090	0.00013	0.05084
Theor. Found. Chem. Eng.	6	0.00061	0.055	0.00003	0.03225
Asia-Pac. J. Chem. Eng.	1	0.00006	0.030	0.00000	0.01216
Chem. Process Eng-Inz.	6	0.00029	0.021	0.00001	0.01826

Ef, Eigenfactor; AI, Article influence.

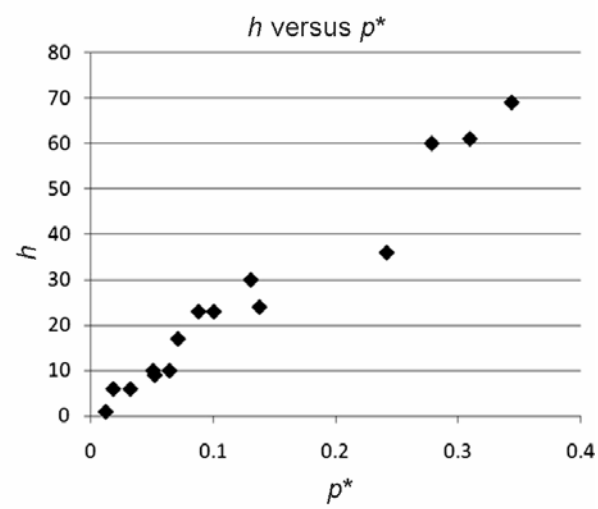

Figure 1. The Pearson's correlation coefficient between $p^* = (\text{Eigenfactor}^{TM} \times \text{Article Influence}^{TM})^{1/3}$ and *h* is 0.980677.

1. Yin, C. Y., *Curr. Sci*., 2011, **100**, 648–653.
2. Prathap, G., *Scientometrics*, 2010, **85**, 561–565.
3. Prathap, G., *Scientometrics*, 2010, **84**, 153–165.

GANGAN PRATHAP

CSIR National Institute of Science Communication and Information Resources,
New Delhi 110 012, India
e-mail: gp@niscair.res.in