

Correction

# Correction: Li, Q.; Liang, S.Y. Incipient Fault Diagnosis of Rolling Bearings Based on Impulse-Step Impact Dictionary and Re-Weighted Minimizing Nonconvex Penalty Lq Regular Technique. *Entropy* 2017, 19, 421

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Received: 5 April 2020; Accepted: 14 April 2020; Published: 23 April 2020



The authors were not aware of some errors and imprecise descriptions made in the proofreading phase, therefore, we wish to make the following corrections to this paper [1]:

On page 3, Section 2, Paragraph 1, the sentence “The first impact approaches a step-like waveform and the second impact resembles an impulse-like waveform,” should be read as: “The first impact could be treated as step-like response (i.e., with low frequency components) and the second impact could be treated as impulse-like response (i.e., with high frequency components) [27].”

On page 4, Section 2, Paragraph 5, the sentence “ $\tau$  is system damping and  $a$  is the peak value ratio of impulse-like to the step-like impact” should be read as: “ $\tau$  is system damping and  $a$  is the peak value ratio of the impulse-like response to the step-like response [27].”

On page 6, Section 3.2, the Paragraph 3 should be read as: “To overcome the above issue, inspired by the ideas of the unconstrained low-rank matrix recovery in Refs. [35–37] that many successful applications have implemented in the compressed sensing field [29–33], a new re-weighted minimizing nonconvex penalty Lq ( $0 < q \leq 1$ ) regular (R-WMNPLq) method is introduced, which is different from the ones studied in [35–37] where uniform random matrix (URM, i.e., the entries of matrix are random variables with uniform distribution) was used. In this work, the impulse-step impact dictionary is utilized for extracting the fault information from its observation or noisy data. The objective function is as follows:”.

On page 7, Table Algorithm 1, the title “Non-Convex-Penalty Smoothed Minimization Lq Algorithm (R-NSMLq)” should be read as “Re-weighted minimizing nonconvex penalty Lq regular (R-WMNPLq)”.

On page 7, Equation (12) should be read as  $(D^T D + \text{diag}(\frac{q\lambda}{(\varepsilon_k^2 + \|\alpha^{(k)}[i]\|_2^2)^{1-\frac{q}{2}}}))_{1 \leq i \leq M} \alpha^{(k+1)} = D^T b$ .

On page 7, Equation (16) should be read as  $(\varepsilon_k^2 + \|x\|_2^2)^{1-\frac{q}{2}} (\varepsilon_{k+1}^2 + \|y\|_2^2)^{\frac{q}{2}} \leq (1 - \frac{q}{2})(\varepsilon_k^2 + \|x\|_2^2) + \frac{q}{2}(\varepsilon_{k+1}^2 + \|y\|_2^2)$ .

On page 7, the sentence “Theorem 1. Error estimation theorem” should be read as: “Theorem 1. Error estimation theorem [35,36]”. The sentence “To prove the theorem 1, the following two lemmas are required” should be read as: “To prove Theorem 1, the following two lemmas (i.e., Lemmas 1 and 2) [35,36] are required”. The citation of [35,36] after Lemma 1 (Page 7), Lemma 2 (Page 8) and Proof of Theorem 1 (page 17) should be cited accordingly.

On page 9, Equation (23) should be read as  $\frac{q}{2(\varepsilon_k^2 + |x_j^{(k)}|^2)^{1-\frac{q}{2}}} \geq \frac{q}{2(\varepsilon_0^2 + \beta^2)^{1-\frac{q}{2}}}$ , and  $\frac{1}{C_4} = \frac{q}{2(\varepsilon_0^2 + \beta^2)^{1-\frac{q}{2}}}$ .

Due to the addition of new references, the order of the original citations has been changed correspondingly.

The newly added references are as below:

27. Sawalhi, N.; Randall, R.B. Vibration response of spalled rolling element bearing: observations, simulations and signal processing techniques to track the spall size. *Mech. Syst. Signal Process.* **2011**, *25*, 846–870.
35. Lai, M.J.; Wang, J.Y. An unconstrained  $l_q$  minimization with  $0 < q \leq 1$  for sparse solution of underdetermined linear systems. *SIAM J. Optim.* **2011**, *21*, 82–101.
36. Lai, M.J.; Xu, Y.Y.; Yin, W.T. Improved iteratively reweighted least squares for unconstrained smoothed  $l_q$  minimization. *SIAM J. Numer. Anal.* **2013**, *51*, 927–957.
37. Wang, Y.; Wang, J.; Xu, Z. On recovery of block-sparse signals via mixed  $l_2/l_q$  ( $0 < q \leq 1$ ) norm minimization. *EURASIP J. Adv. Signal Process.* **2013**, *2013*, 76.

These changes do not influence the conclusions of this paper. The authors would like to apologize for any inconvenience caused.

## Reference

1. Li, Q.; Liang, S.Y. Incipient Fault Diagnosis of Rolling Bearings Based on Impulse-Step Impact Dictionary and Re-Weighted Minimizing Nonconvex Penalty  $L_q$  Regular Technique. *Entropy* **2017**, *19*, 421. [[CrossRef](#)]



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