

**Title:** Characterizations of weighted dynamic Hardy-type inequalities with higher-order derivatives

**Authors:** S. H. Saker, **R. R. Mahmoud** and K. R. Abdo

**Publication date:** 7 June 2021

**Journal name:** Journal of Inequalities and Applications

(ISSN: 1029-242X)

(IF: 2.491, Q1)

**Volume:** 2021; **Pages:** 1–17.

**Publisher:** Springer.

**Received:** 23 February 2021; **Available online:** 7 June 2021.

**Authors' contributions:** The authors are contributed equally to this article.

**Is the research extracted from a scientific thesis? :** No

**URL:** <http://dx.doi.org/10.1186/s13660-021-02633-8>; **DOI:** [10.1186/s13660-021-02633-8](https://doi.org/10.1186/s13660-021-02633-8)

### **Abstract.**

In this paper, we establish some necessary and sufficient conditions for the validity of a generalized dynamic Hardy-type inequality with higher-order derivatives with two different weighted functions on time scales. The corresponding continuous and discrete cases are captured when  $\mathbb{T} = \mathbb{R}$  and  $\mathbb{T} = \mathbb{N}$ , respectively. Finally, some applications to our main result are added to conclude some continuous results known in the literature and some other discrete results which are essentially new.