

招聘機関報告書

1. 招聘機関名 : 国立研究開発法人宇宙航空研究開発機構 (JAXA)
航空技術部門 数値解析技術研究ユニット
2. 交流テーマ : 米国における高速回転翼機および垂直離着陸電動推進航空機 (eVTOL)
等に関する国際的研究交流・ネットワーク構築
3. 研究者氏名 : Inderjit Chopra 博士
米国メリーランド大学 The Alfred Gessow Rotorcraft Center 所長
4. 招聘期間 : 令和元 (2019) 年 12 月 12 日～12 月 20 日
5. 研究者等の活動およびその成果に関する評価、所見

<主な訪問先および活動>

12 月 13 日 (金) :

国立研究開発法人宇宙航空研究開発機構 (JAXA) にて、日本ヘリコプタ協会主催、公益財団法人航空機国際共同開発促進基金 (IADF) の共催により特別講演会を開催。

「Small UAS and Delivery Drones: Challenges & Opportunities」というテーマで講演。日本ヘリコプタ協会会員の他、関東地区の大学関係者、JAXA 関係者など、約 40 名が参加。講演会后、高速コンパウンドヘリの模型、実験用ヘリコプタ、およびヘリシミュレータを見学し、意見交換を実施。

12 月 16 日 (月) :

東北大学を訪問。同大学実験設備等の見学、および学生らとの意見交換を実施。

また、「Small UAS and Delivery Drones: Challenges & Opportunities」をテーマとするショートコースレクチャーを実施。東北大関係者約 35 名が参加。

12 月 17 日 (火) :

名古屋大学を訪問。「Small UAS and Delivery Drones: Challenges & Opportunities」をテーマとするショートコースレクチャーを実施。名大関係者の他、名古屋地区の航空関連企業関係者など、約 30 名が参加。また講演会后、株式会社 SkyDrive との意見交換を実施。

12 月 18 日 (水) :

岐阜かかみがはら航空宇宙博物館を訪問。人力ヘリコプタ YURI-1 号を見学。メリーランド大学では人力ヘリコプタにも力を入れていることから、同博物館関係者との意見交換を実施。

また、川崎重工業株式会社 (KHI) 岐阜工場を訪問。「Aeromechanics of Compound

「Rotorcraft」というテーマでの講演、工場見学、およびヘリコプタ設計・開発に携わる関係者との意見交換を実施。講演会には、KHI 関係者約 40 名が参加。

12 月 19 日（木）：

三菱重工業株式会社（MHI）名古屋航空宇宙システム製作所小牧南工場を訪問。

「Aeromechanics of Compound Rotorcraft」というテーマでの講演、工場見学、およびヘリコプタ設計・開発に携わる関係者との意見交換を実施。講演会には、MHI 関係者約 30 名が参加。

<成果に関する評価、所見>

本助成制度を利用し、Chopra 教授には、日本滞在中に様々な企業・大学・研究機関等を訪問いただき、回転翼の研究開発に関する講演および意見交換を実施した。大学および研究機関への訪問時には、近年のホットトピックである eVTOL に関する最新の研究開発状況や、今後の課題について詳細に紹介いただき、学生や研究者との有意義な意見交換が交わされた。

また、企業各社への訪問時には、高速ヘリコプタに関する最新の研究開発成果に関して紹介いただき、活発な意見交換がなされた。各訪問先でそれぞれが抱える技術的課題についても活発に意見が交わされており、今後、各訪問先と Chopra 教授との具体的な連携が大いに期待できる。

最後に、本交流の実現を支援いただいた、公益財団法人航空機国際共同開発促進基金殿に深甚なる感謝の意を表す。



6. 研究者報告書：P.3～4参照

Report on Company/University Visits from December 12 to December 20, 2019

Sponsored by International Aircraft Development Fund (IADF)

By

Inderjit Chopra

Distinguished University Professor

Director Alfred Gessow Rotorcraft Center

University of Maryland, College Park, Maryland, USA

Arrival at Tokyo (December 12):

After leaving Washington DC (IAD airport) (USA) on December 11 (Wednesday), 2019, I arrived at Narita Airport (Tokyo) on December 12. At the Airport, I was received by JAXA Researchers . They accompanied me to the hotel (Shinjuku, Tokyo) and helped me with the check-in process at the hotel.

1. Visit to JAXA (December 13)

JAXA Researchers picked me from the hotel in the morning of December 13 (Thursday) and took me to JAXA Chofu Aerospace Center. At JAXA, Director General of Aeronautical Technology Directorate welcomed me and I was given the tour of Exhibition Room DAHWIN. After the tour, I gave the very first invited lecture on *“Small UAS & Delivery Drones: Challenges & Opportunities.”* This lecture was jointly hosted by the Japan Helicopter Society and IADF. Soon after this lecture, I was introduced to personnel of IADF and many other important persons of JAXA. After the lecture, I was given a tour of the Aerodynamic Branch of JAXA, where I had the opportunity to see high speed helicopter model and the helicopter simulation lab.

2. Visit to Tohoku University (December 16)

On December 15 (Sunday), JAXA Researchers helped me to check-out the hotel and take the Shinkansen high speed train to go to Sendai. Professor received us at the Sendai train station and helped us to check-in at the hotel. On December 16, Professor picked us up from the hotel and took us to Institute of Fluid Science (IFS), Katahira Campus, Tohoku University. Director of IFS welcomed us at the Institute and explained us ongoing research activities. At IFS, we were given a tour of Low Turbulence Wind Tunnel, 1-M MSBS, Ballistic Range and MARS Wind Tunnel. From IFS, we were taken to the Aobayama Campus, where we had lunch with graduate students in the Aerospace Graduate Laboratory. I gave my second invited lecture on *“Small UAS & Delivery Drones: Challenges & Opportunities”* ME Common Building.

3. Visit to Nagoya University (December 17)

On December 17 (Tuesday), we checked-out the hotel and took a flight from Sendai Airport to arrive at Chubu International Airport, Nagoya. JAXA Researchers helped us from the airport to check-in at the hotel. In the afternoon, JAXA Researchers accompanied me to the Nagoya University where I gave my third invited lecture on *“Small UAS & Delivery Drones: Challenges & Opportunities”* in the ME Common Building.

4. Visit to Gifu-Kakamigahara Air and Space Museum (December 18)

JAXA Researchers took me to Gifu-Kakamigahara Air and Space Museum. The museum staff provided us an extensive tour of YURI-1 and other Japanese built historic aircraft. YURI-1 is the very first successful human powered helicopter that had a sustained hover by a human pilot.

5. Visit to Kawasaki Heavy Industries (KHI) (December 18)

KHI provided transportation to move us from Museum to Kawasaki Heavy Industries in Kawasaki-cho, Kakamigahara. At the plant, there was a welcome introduction by the Senior Vice President. Thereafter, I gave my fourth invited lecture on *“Aeromechanics of Compound Rotorcraft”* to KHI engineers and JAXA Researchers. After the lecture, there was a general session of questions and answers on a range of topics. After general discussions, a tour of the manufacturing facilities was provided.

On December 19 (Thursday) morning, there was a meeting with engineers from SkyDrive Inc about their air taxi project.

6. Visit to Mitsubishi Heavy Industries (MHI) (December 19)

JAXA Researchers accompanied me to visit to MHI at Nishi-Kasugai-gun, Aichi. After the welcome and Introduction by the MHI Senior Vice President, a tour of the MHI manufacturing facilities was provided to us. Thereafter, I gave my fifth invited lecture on *“Aeromechanics of Compound Rotorcraft”* to MHI engineers and JAXA Researchers. After the lecture, there was a general session of questions and answers on a range of topics.

On December 20 (Friday), I checked-out the hotel and took flight from Chubu International Airport to Narita Airport. From Narita, I took international flight and arrived in Washington DC (IAD Airport) on the same day (December 20).